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SNAILS IN THEIR RELATIONS TO THE SOIL*

By HARLEY J. VAN CLEAVE

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The Changing Earth.—Popularly, streams and lakes or ponds are very commonly thought of as relatively permanent features of the earth's countenance, even though physiography teaches that they are but temporary aspects in a series of successional changes between water and dry land. By erosion, soils, are washed into lakes and ponds from the surrounding land. Ultimately, the shallow water at the margin with its fixed vegetation encroaches upon the open waters which, at the same time, are becoming shallower through the accumulation of silt at the bottom of the lake. If these processes continue, the lake is gradually transformed into a marsh or swamp land and there results an intermediate stage between the purely aquatic habitat and dry land. Snails of many species thrive in the shallow waters at the margin of a lake or swamp where vegetation is abundant enough to provide them with a constant food supply. They live their relatively limited life span and after death the empty shells accumulate in the ooze at the bottom of the pond. The lake bottom thus becomes an admixture of soil and organic debris, washed in from the surrounding land, and the resistant remains of the organisms that once lived in the lake. Ultimately, in the processes of nature or by will of man, the lake may revert to dry land. Then the content of the old lake bottom is exposed for easy inspection and the shells which have been accumulating for ages are exposed to view. The interpretation of these deposits of limy shells involves an understanding of the varied conditions under which snails live and likewise consideration of the agencies responsible for their accumulation in the soil, where their influence on agriculture has long been recognized. Regarding the significance of lime in agriculture, Truog (1938) has said, "It is not too much to say that it must be considered the very backbone of profitable crop production, soil conservation, and permanent agriculture in the humid regions of this country."

Importance of Living Snails.—Biologically, snails have many important relationships in addition to their effect upon their physical environment. They have long been recognized as important elements in food chains. Living chiefly on vegetation, they in turn become food for fishes and a great variety of other animals and thus in an endless cycle they keep much of the organic material of which their bodies are composed passing from one incarnation to another and at the same time much of the material from their dead bodies and their wastes are continuously bridging the gap, back and forth, within the bodies of plants and animals.

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*This is a revision of a paper prepared originally as a seminar for presentation before a group of agronomists in the University of Illinois.

In their capacity as necessary hosts for the digenetic trematodes, which live as parasites in all of the classes of vertebrates, snails have peculiar biological significance.

It is an indisputable fact that food wastes passing through their digestive tracts have significant effect upon the organic content of the soil and of the water in which snails live but there have been no quantitative studies paralleling the classical work of Charles Darwin on the effects of earthworms in the production of vegetable mould. Interesting as these aspects of relations between snails and their environment may be, they will be omitted from the present discussion and attention will be restricted to the role played by snails through the addition of lime to the soil.

Relations to Surroundings. — While some species of snails have very broad tolerance of conditions under which they will live, there are many species which are sharply limited by their physical surroundings or by their necessity for association with particular types of living things. Thus, among the water dwelling snails, some of the forms of the old genus Physa which breathe through a lung sac, can prosper in water that is heavily poluted by sewage *(Physa anatina)* and at times become abundant even in sewage treatment plants (Brown, 1937). Other forms of the same genus (e.g., *Physa gyrina hildrethina*) occur only in pools, while still other closely related forms *(Physa gyrina gyrina)* are characteristic inhabitants of more swiftly moving streams. Among the snails that dwell on the land, there is even more pronounced limitation to the conditions under which many species will live (Baker, 1939). One species *(Discus patulus)* is invariably associated with woodlands in which beech and maple trees are growing. This species is considered as an invariable associate of what ecologists term the beech-maple forest. It is not that Discus feeds upon either beech or maple, but the conditions of soil and of climate favorable to these trees are at the same time the set of conditions demanded by Discus. There are many other snails which are usual associates of particular kinds of plants and animals because the latter provide the natural food for the snails. One of the commonest woodland snails of central Illinois is *Mesodon thyroidus* which will feed upon a wide variety of vegetation but becomes particularly thrifty and abundant where woods nettles grow in profusion (Foster, 1937). Some land snails have feeding habits wholly different from that just mentioned. For example, *Haplotrema concavum* is carnivorous and lives largely upon the flesh of other snails. Physical surroundings are less important in the life of the last mentioned species, just so long as a supply of snails is available to serve as food.

Many land snails are indicators of the physical conditions under which they live (Baker, 1921). Their soft bodies are best served by relatively high atmospheric moisture so that moist ravines sheltered from the direct rays of the sun are particularly favored habitats and many species become especially active at night and during rains. Some of the land snails (as, for example, some species of the genus *Succinea*) are so exacting in their demands for moisture that they live a truly amphibious existence remaining only a portion of the time out of water and always close enough to water to be able to return to it if they become too dry. Even when snails live in exposed situations, such as in open fields and along railroad embankments, or under desert conditions, they tend to conserve their moisture by crawling under objects lying on the soil or even live in the roots of the vegetation. Further, many land snails are able to cut down evaporation from their bodies, when inactive, by secreting a tough membrane, the epiphragm, effectually sealing over the aperture of the shell.

Whether in the water or on dry land, the shells of dead snails often resist destruction for a long period of time and under proper conditions they accumulate in extensive deposits. By the study of these deposits, which often

DR. H. J. VANCLEAVE

represent forms of by-gone geological age, the student familiar with the habits of living snails is often able to analyze the conditions under which each species probably existed. In fact, at times it has been possible for the special student (Baker, 1937) to postulate the general temperature range and something of the ecological conditions of the environment under which the animals which produced the dead shells lived, even though that might have been at some remote time, several thousand years, in the past. With a considerable degree of confidence, Frank C. Baker (1937) postulated the climatic conditions and the ecological associations for some of the molluscan faunas of the ice age. In his studies of shells of the Pleistocene age, he found among Illinois deposits some species which are identical with forms dwelling in the same area today but he also found some shells representing species the only living varieties of which are today found at latitudes considerably farther north. A knowledge of the habits and living conditions of present day forms has been helpful in interpretation of the conditions under which similar forms of past ages probably existed.

When the Chicago Drainage Canal was constructed, Baker (1930) was able to study the evidences if the molluscan life in old Glacial Lake Chicago, the forerunner of Lake Michigan, and could demonstrate fluctuations in lake level, changes from swampy to lake conditions, and from deep to shallow water.

The glacial advances and retreats of the Pleistocene Epoch profoundly affected all life, including the terrestrial as well as the fresh-water Mollusca (Baker, 1930a). Following an advance of the ice sheet, all life was killed or was driven southward, causing a commingling of arctic, subarctic, and temperate life south of the border of the continental ice sheet. During the warmer interglacial intervals, this life again returned to the territory left bare by the retreating ice just as rapidly as the vegetation essential to its existence became established. In the series of repeated invasions by the glaciers, there were successive decimations and repopulations in the same area. The reoccupied territory, left found influence upon the kinds of plants entirely different from that previously existing. Such radical changes had profound influence upon the kind of plants and animals that could become successfully established in the area. Changed climatic factors also contributed to the altered conditions for life. Under the combined action of these factors, some species became exterminated while others were stimulated to undergo variations which led to the production of new species. For the glaciated part of the United States, it is estimated that 74 per cent of the mammals of preglacial times are extinct. It should be remembered that from one to five million years are estimated as the period in which this was accomplished. Of the fresh-water, gill bearing snails, 13.8 per cent are extinct; of the fresh water pulmonates, 8.3 per cent, and of land snails, 11.1 per cent. By way of summary for the entire area, about 7.8 per cent of all animal species became extinct.

In acid waters, snails and mussels are almost wholly lacking and the small numbers of unthrifty individuals which are encountered in either natural or artificially produced acid waters have either extremely thin shells or if the acidity is due to recent polution the limy material is eaten away wherever the organic covering has been broken by natural abrasion or by accident.

Lime Supply.—Molluscs are so intimately dependent upon a lime supply for the fabrication of their limy shells that among fresh water forms some of the poorest molluscan faunas are encountered in the areas poor in limestone but rich in granite. This correlation is close enough that collectors of land shells have long recognized limestone cliffs and outcrops as particularly favorable collecting sites for living land snails and streams flowing through limestone or through soils rich in lime as particularly productive of snails and mussels.

Snails, living and dying in the same place, little influence the lime supply for the limy material which they use is sooner or later returned to the soil again and the lime cycle is repeated over and over within and without the shells of the living snails. When the shells disintegrate, the lime which had been temporarily entrapped is again returned to the general store. No quantitative studies have been made to determine if there is any dissipation of the available lime supply in this cyclic utilization of lime by the living organisms.

The late T. D. Foster (1937) recorded for a flood plain forest along the Sangamon River in Illinois, the presence of 2,630 individuals of one species of land snail *(Mesodon thyroidus)* per acre. Though there are about a score of species of snails present in this same area, the one species is the most abundant and relatively the most important so far as production and utilization of lime is concerned. On the basis of weights which Foster calculated, about 169 pounds of *Mesodon thyroidus* are present on each acre of the woodland studies. Of this weight, about 140 pounds are of snail flesh and about 29 pounds are of dry shell. This does not represent the entire annual accumulation but rather the amount present at one time in the shells of living snails as determined by sampling methods. Because of the cyclic fluctuations in abundance of all types of organisms, figures of this sort have but relative value for at another time either greater or lesser abundance might be demonstrated (Foster and Van Cleave, 1937). However, the presence of the snails is an indicator of available lime supply and in turn their shells after death return lime to the soil as potential material for use by other organisms.

To a much smaller degree, the shells of zonitoids, pupids, and other minute snails living in grasslands utilize the available lime and return it to the soil, although quantitative studies on the losses in the transfer and by action of ground water have never been determined.

Shells not Stationary.—In referring to the intimate relationship between the molluscan fauna and their physical and biotic environment, attention should be directed to the fact that deposits of shells are found in environments different from those in which they originated. There are many factors responsible for this fact, but the chief of them may be grouped under two headings: (1) translocation of the dead shells and (2) physiographical changes of the earth's surface.

Translocation. — Water, ice, wind, and human agency are the chief factors in translocation and accumulation of dead shells in areas other than those in which they originated on the bodies of living snails. Both recent and remote geological times have contributed to the stock of shells now found in the soil and, through the agencies for translocation, shells from past ages may become elements in the construction of soils at the present time where they may be mixed indiscriminately with shells recently produced.

Many limestone deposits include fossil shells of snails and clams of long-past geological ages along with the remains of multitudes of other organisms having limy skeletons, such as the corals, certain types of Protozoa, and echinoderms. These components of the sedimentary limestones provide deposits of lime utilized by modern molluscs in the production of their shells. These same limestone deposits are utilized commercially in the production of limestone for agricultural purposes. Here the shells of snails, clams, protozoans, and corals of geologically ancient oceans provide a renewed source of lime on lands where weathering, leaching, and cropping have depleted the natural supplies. Much of the lime now available in fresh water thus comes from the geologically old lime deposits, largely of marine origin. Ground water, flowing over and through the limestone, dissolves the lime and makes it available for the aquatic animals in fresh water.

Another type of translocation by water is that in which running water carries dead shells and lays them down in a new location either at the bottom of a lake or pond or along the margins of streams. If the water carries much abrasive material, the shells may be ground fine and mixed with the mud and sediment, though often they are uninjured. When the course of the stream is changed, through natural or human agency or when the bed of a lake or swamp is drained, the accumulated shells are exposed as marl deposits and attract more attention than they could while covered with water.

Surface waters on rolling lands often tend to wash dead land shells into gullies or against obstacles such as the stems and roots of grasses where definite windrows accumulate awaiting decomposition or further translocation by other agencies. In fact, an examination of gullies and hill sides often reveals to the collector dead shells which have been washed down from higher grounds where colonies of living snails may be located.

Winds are likewise effective agents in transporting dead shells. The evidences in support of this statement come largely from past geological times. Fine sands and shells from some prehistoric dustbowl were carried great distances by the winds and were then laid down in the characteristic deposits called loess. These formations, rich in fossil snail shells, are highly desirable agricultural lands.

The fauna of the loess probably lived under conditions practically the same as those prevailing today. Many of the larger species were inhabitants of forested areas along river bluffs. Some of the smaller species doubtless lived in open woods or thickets, or even on the open prairies as they do today. In southern Illinois, the loess deposits are entirely different from those in the northern part of the state with respect to the molluscan fauna. In the southern loesses, there are large land shells, abundantly represented although these are almost wholly lacking from the loess of northern Illinois and their place is taken by minute species. A part of this variation is probably due to climatic differences, similar to and even exaggerated above those existing today. Loess deposits in northern Illinois probably began soon after the retreat of the ice and under such conditions that the climate would have been considerably colder than at present. Geologists seem convinced that isotherms were displaced southward during considerable part of the period while loess was being deposited. Under these conditions it would be highly probable that temperature conditions in central and southern Illinois at that time were more nearly what we find now in central or southern Michigan and Wisconsin.

Human Agency. — Shell heaps of enormous size have often been formed by human agency. Pre-columbian Indians, especially along the coast, used shellfish for food and some tribes produced very extensive beds of shells at their camp sites. Even in the central states, primitive Indians left extensive accumulations of snail shells in some places, (Baker, 1936) probably having utilized the snails as food. In like manner, shells and shell artifacts are scattered through the mounds produced by the race of mound builders, though not in the quantities characteristic of the kitchen middens.

On top of natural deposits of shells, there are frequently found shells the presence of which would entail extreme changes in temperature and in the extent of the oceans if they were natural deposits. In dredge-cuts in northern Illinois, there have been found fairly good samples of shells that have never been known to live anywhere except in Florida and many of these are strictly marine species. The only logical explanation of this condition is that Indians left them at camp sites. It is generally known that well established trade routes had been established by the early American Indians and it is known that they traded in and cherished some of the seashells, even though they had to be transported long distances to the interior of the country.

Modern man has also had his influence upon direct distribution of shells. Through the oyster and other shellfish industries, including pearl button factories, huge spoil heaps of shells are accumulated incident to commercial operation. In many instances, these wastes are converted into commercial products for feeding poultry and as crushed shell for lawns and gardens.

Physiographical Changes. — Elevations of the shore line or depression of the water level of the ocean and even of lakes and rivers, often leave natural deposits of dead shells exposed to the action of the weather and available for building soil. Also, in the instances of the earth's crustal movements, regions that were formed as rock deposits in the bottom of the ocean become elevated and folded as hills and mountains and deposits of rocks containing snails and other lime bearing shells become exposed through weathering and folding of the strata.

At times, outcrops of shells occur in isolated spots in fields. Physiographical changes are likewise responsible for this phenomenon. When these deposits occur in depressions, they are readily explainable as due to the irregular shape of the lake or swamp on whose bottom they were deposited or were brought in by various of the agencies mentioned above. However, in some instances the isloated patches tend to be on slightly elevated ground, not in gullies. In such cases, only speculation can be brought in as an attempt at explanation. The writer believes that the most logical explanation is one that involves considerable periods of time. At some past age, an old lake bed filled up and in its bottom were deposited layers of shells overlain with other deposits of sand or of muck. By changes in the drainage, streams could cut through this level plain, sinking their channels through the overlying deposits and finally through the shell accumulations. Depending upon how long these newly established streams operated would rest the nature of the shell deposits which they left exposed. If they, as young streams, had cut relatively straight courses, then the shells would be exposed along the banks of the streams or along gullies when the stream finally disappeared. Under other conditions, if the streams were to continue for a long time, they would meander through the old, exposed lake bed cutting down and carrying away almost all of the original shell deposit, leaving it only on knollsides and on slight elevations where the stream was unable to erode the knoll, or other portion of the soil, away because of difference in its consistency. In such an old lake bed, the action of a meandering stream cutting its ever widening and wandering channel might readily leave isolated patches of shelly material on slightly elevated places where at an earlier date the shell material had been a continuous sheet in the deepest part of a former pond or lake.

Summary.—By way of summary, it may be stated that all the accumulations of shells, whether from present day or ancient origin, represent stored supplies of lime, available for modifying the soil and making it suitable for plant growth. At times, the shell deposits of cultivated land occur in combination with conditions unfavorable to crop growth. In these instances the shells are only indicators of other conditions which, in turn, are responsible for adverse conditions because when adequate drainage or manuring is carried our the faults are corrected, Often, the shells of snails are found on agricultural lands, as is the case of marl and loess deposits, and apparently they add to the productiveness of the land. The observable snail shells in the soil do not comprise the entire effect of snails upon the soil. In many instances, the shells are finely broken and unrecognizable and, in the loess, ground water is known to dissolve out lime and to translocate it to lower soil levels or to the ground water where it becomes a part of the lime supply of natural waters. Furthermore, the snail shells of long past ages are united with other limy shells of animals in the formation of the limestone deposits which are then secondarily used for agricultural purposes. In this discussion, no attempt has been made to evaluate the place of living snails in the production of humus and in the addition of organic matter to the soil.

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OBSERVATIONS ON THE GALATHEA EXPEDITION

By Inocencio A. Ronquillo[1]

Having had the rare opportunity of becoming a guest biologist on board the Royal Danish Deep sea Research Vessel "Galathea", the writer wishes to acquaint the public with the observations made on some of the modern techniques performed by this famous research vessel while it surveyed the Mindanao Deep, the deepest part of all oceans. This Deep is situated about 40 kilometers east of Surigao Province, Mindanao. The trough starts off the island of Samar and runs parallel to the eastern coastline of the island of Mindanao.

The scientific staff was composed of young biologists, oceanographers and mathematicians who had just finished their master's degree. Some of the sailors were working for their master's degree while serving the Royal Navy and at the same time taking the opportunity of becoming members of a world-wide scientific expedition. Under the leadership of Dr. Anton Fr. Bruun, of the University of Copenhagen, these young scientists were really capable of doing what they were assigned to do. They were very well prepared both physically and mentally.

The expedition was purposely made to study animals and living conditions in the deepest parts of oceans all over the world. However, enroute to and from the Mindanao Deep it also collected all kinds of animals in all places of the earth's surface they visited. This included insects which were caught on board the ship and birds and shore animals which were caught whenever the Danish scientists were on land. In this connection, it is interesting to note that for the first time in the history of a scientific expedition, the animals were sorted as soon as they were collected, labeled accordingly, and kept together with their respective groups. This will not only save a lot of sorting when they shall have amassed a lot of specimens but also facilitate their identification, when the two-year expedition is over.

The most important biological technique done on board the ship was the collection of animals from the ocean beds by means of trawls of different sizes. These were lowered to the bottom and dragged for a couple of hours. The trawls were attached to one end of a metal cable more than 12,000 meters long, which was paid out and hauled in by two powerful winches. The cable itself weighed about 12 tons. By proper calculation, the position of the trawl under the water could be easily determined. Using this technique, we were able to raise from the bottom of Mindanao Deep of more than 10,000 meters, deep water sea anemonae; small deep sea holothurians, bivalve mollusks; (Lamellibranch); amphipods and tanaidarians. Most of these animals were attached to rocks so that they possibly could not be found floating.

Water samples were taken from the bottom with the use of reversing water bottles with attached thermometers which recorded the temperature of the water at the time when the samples were taken. The water bottles were clamped to a small wire cable more than 12,000 meters long, which was lowered and hauled by the hydrographiic winch. With this technique, water samples from more than 10,000 meters were taken. Portions of the samples were tested for the presence of dissolved nutrients and salinity. The rest of the water samples were sealed in ampoules which will be tested micro-chemically as well as for radioactive property in Copenhagen, Denmark. One might ask how cold must the water be at such depths. The lowest temperature obtained was 1.59°C at a depth of about 3,500 meters.

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[1] President—Alpha Chi Chapter, University of the Philippines. Marine Zoologist—Philippine Bureau of Fisheries and guest biologist on board the "Galathea" while in Philippine waters—July-August, 1951.

A mud sample from the bottom of the Philippine Deep was taken and brought to the surface for the first time by means of a Petersen grab, a device which automatically closes on a sample upon hitting the bottom. This grab covers an area of 1/10 square meter. The mud sample obtained from a depth of 10,395 meters was blackish green sand which was covered with brownish clay.

A small portion of the sample was taken to find out if bacteria were found in the mud. This was treated aseptically and then inoculated in a special media of different dilutions both in aerobic and anaerobic conditions. Dr. Claude E. Zobell, leading American authority on marine microbiology, who was also a guest biologist on board, put some of these cultures in steel cylinders which were subjected to a pressure of 1,000 atmospheres and placed in a refrigerator to simulate the condition *in situ*. He obtained conclusive evidence that bacteria of the nitrifying type were present in the muddy bottom of Mindanao Deep. Some of the mud samples were saved for further study at the Scripps Institution of Oceanography where he hopes to establish the identity of the said bacteria.

A Kullenberg core sampler was used to get a mud sample from a depth of 10,328 meters. The sample which was 75 centimeters in length was contained in a plastic tube which was inserted with the sampler before the core sampler was lowered down. The ends of the tube were sealed as soon as the sample was brought on board. The texture, arrangement, and composition of the mud core might give important information regarding sedimentation rate and age of the Mindanao Deep with the help of isotopes of radioactive substances which might be present in it.

In these operations the paying out of the cable was at the rate of about a meter per second at its slowest speed. It took more than 6 hours to pay out and another 6 hours to haul in the cable at a depth of about 10 kilometers.

Another interesting phase of the work done on board was the new method of determining the production of organic matter by microscopic plants in the sea with the use of a radioactive isotope of carbon, C_{14}. With the use of fluorescent light which simulated the condition of illumination in the sea, microscopic plants floating in sea water were made to grow and reproduce in the presence of the radioactive carbon. After four or six hours, the amount of carbon incorporated in the bodies of these plants in the form of carbohydrates was measured. To do this, the microscopic plants were filtered and then placed in a Geiger-Muller Counter which measures the radiations of the radiocarbon. In this way the amount of carbon assimilation by plants floating in the ocean was directly measured and used as a basis for determining the organic productivity of sea water. It should be remembered that the organic production by these aquatic plants constitutes the first link in the food chain of aquatic animals. This procedure when performed in areas all over the world, might give comparative measurements of organic productivity of marine waters.

The depth of the ocean was determined by using a Hughes Recording Echo-Sounder which is a special instrument for sounding deep waters. Impulses sent out from the bottom of the ship were reflected by the ocean bed and the time between the sending and the recovery of the echo resulted in an accurate picture of the depth of the ocean which was recorded on paper.

THE FIRST NATIONAL PHI SIGMA LECTURESHIP

By Laurence H. Snyder

Dean of the Graduate College, The University of Oklahoma

When I was asked to visit the western chapters of Phi Sigma in the spring of 1951, and to present a seminar and a public lecture at each member institution, I was doubly happy to accept. The first reason was that I sincerely like to talk about human heredity and to discuss some of its problems with my fellow biologists. The second reason was that Mrs. Snyder and I thoroughly enjoy traveling. Although we had been on lecture trips from border to border and coast to coast in this country, and several times to Europe, we had never had the opportunity of visiting the northwest. We therefore welcomed the chance to make the Phi Sigma tour.

Since the time available for me to be away from my office was limited, I had to arrange to visit the twelve western chapters within the space of three weeks. I discovered that it was no easy task to make plane and train schedules come out even, and fit into dates which were acceptable to the various chapters. We had to try several tentative schedules before the dates were satisfactory to everyone.

Finally, with the cooperation of ticket agents and especially of the chapter officers, we were ready to start on our whirlwind schedule.

We left Norman at 4:00 A.M. Monday May 7, on the Santa Fe, bound for Lawrence, Kansas. Arriving there at 1:12, P.M., we were met by the officers of the chapter, taken on a quick tour of the campus, and presented to the chapter at 4:00 for a seminar. In the evening I attended the initiation banquet and addressed the group, while some of the ladies took Mrs. Snyder on a social event.

Mrs, Snyder has heard me talk so many times that I am sure she could give any one of my addresses for me on a moment's notice just by pressing the proper button. I am always happy for her when the ladies kindly spirit her away for a concert or show during my talk. On this trip our hostesses were especially kind, and I doubt if she had to listen to more than three or four of the thirty talks I gave.

Dr. Young, the sponsor of the Kansas Chapter, kindly provided overnight lodging in the beautiful new home he and Mrs. Young have built.

The next morning, May 8, the Youngs got us up early and drove us to Topeka, where at 8:33 we boarded a Continental plane for Denver. Here Dr. Fred Zeiner, sponsor of the chapter at the University of Denver, met us. This was one of the busiest parts of the trip, since the University of Denver and the University of Colorado are so close, and talks at both were crowded into the same day.

At the University of Colorado, Dr. Gordon Alexander, sponsor of the chapter, was our host. Here, as in many other places along the trip, the lectures were open to the public. Everywhere the audiences were large, and I was extremely pleased with the enthusiastic response to the advance notices which the chapters had provided.

We took a camera and kodachrome films with us, and at each place we made colored slides of the biology building, the officers of the chapter, campus views, and places of scenic interest. The pictures came out wonderfully and are among our prized posessions.

We left Denver by air for Salt Lake City, and to our delight the plane flew by way of Wyoming, which we had never seen. Coming into Salt Lake City from the north, I got some excellent pictures of the snow-capped mountains from the plane windows, and of Great Salt Lake.

The chapter officers met us, and put us up at the Hotel Utah. We had a fine tour of the City and of the nearby canyons. The President of the University, Dr. Olpin, is an old friend of ours, and after the evening lecture we renewed our friendship with Mrs. Olpin and the President in a long visit.

We left Salt Lake City at 7:30 A.M. by Western Airlines, arriving at Butte, Montana about eleven o'clock. A bus took us through scenic splendor of Bozeman, where at 3:00 P.M. the officers and sponsor of the Montana State College chapter met us and took us to the Hotel Baxter.

While I talked, Mrs. Snyder went with the ladies to various events. For visitors from flat Oklahoma, the now ever-present mountains were a continuous delight, and we never tired of looking at them. We have many fine mountain pictures, all in color.

The trip the next morning by the Northern Pacific Railway over the continental divide from Bozeman to Missoula was one of the most memorable we have ever had. The scenecy was awe-inspiring, and we were emotionally exhausted when we arrived at Missoula. We have taken many wonderful journeys, including the famous Bergensbahn from Oslo to Bergen in Norway, but never have we been so inspired as in the matchless sheer stark beauty of the Rockies around the continental divide.

In Missoula we were met by Dr. and Mrs. Browman, who were to be our hosts. He is the sponsor of the chapter of the University of Montana. After seeing the campus, I gave an evening lecture while the Browman daughter took Mrs. Snyder to a play at one of the University buildings.

Among my hobbies is an interest in birds. Knowing that I was now in the territory of the yellow-headed blackbird, which I had read of but never seen, I asked Dr. Browman whether it might be possible to observe some. He kindly arranged with their ornithologist to take me out in the country the next morning to a pond where these birds nested.

Although we had now visited and talked at six chapters in five days we got up enthusiastically at daybreak and drove out. The trip was more than worth the effort, and we had a close-up view of a large colony of these most interesting birds.

The seminar at the University of Montana was set for the morning, and we returned from the blackbirds to the lecture room. At several points on the trip I was prevailed upon to give more than the two talks I had promised for each chapter. Missoula was one such place. Here I gave a radio interview over station KGVO, and enjoyed it immensely.

My seminars were given on the topic "How Genes Act". I discussed the enzymatic activity of genes, resulting in traits or characteristics, and gave examples from human disease inheritance, tracing the chemical activities of metabolism, and pointing out where mutations interfered with the normal metabolic processes, bringing about diseases ar anomalies.

The evening lectures were on the topic "Genetics and Modern Life". Here I illustrated with examples the practical applications of a knowledge of human heredity in diagnosis, prevention, advice to families, and the medical and medico-legal problems centering in the heredity of the blood groups.

We left Missoula by the Milwaukee Railroad Saturday afternoon, May 12, somewhat tired but very happy with our trip thus far. We arrived in Tacoma at 9:05 A.M. Sunday, and found several members of the chapter of the College of Puget Sound awaiting us. They had a delightful surprise planned for us, and soon we were as excited as they were.

After showing us our quarters in the dormitory, the whole chapter took us on a picnic up in Mount Rainier National Park. It was a most delightful day, and although at the start the mountain was shrouded in clouds, it gradually emerged, and Mount Rainier was added to our pictures. We went as far as Paradise, and one of my pictures shows Mrs. Snyder with thirty feet of snow behind her.

We had carefully packed raincoats, but we wore them only for warmth. It did not rain on the whole trip, and we could not have asked for more perfect weather in those 21 days.

On Monday I gave my talks in Tacoma, and Tuesday morning we were driven to Seattle. Miss Gertrude Horn, President of the chapter at the University of Washington, had arranged everything with the cooperation of Dr. Hatch, the sponsor of the chapter. Our visit here was short, and after the evening lecture we took a late train to Portland. At Portland we changed early in the morning to the Southern Pacific for Albany, Oregon, where we were met and driven the short distance to Corvallis.

Here we were the guests of Dr. and Mrs. Charles H. Martin. As the sponsor of the chapter at Oregon State College, he had arranged a very nice sequence of events. There was time for a long drive in the Mount Mary area, where we saw the logging operations. Then came the seminar and the evening lecture. By this time I was finding it difficult to know at any given moment just where I was, but I realized that most of the events and memories would have to be sorted out at leisure when we arrived home. We had mailed each roll of film as it was completed, and we counted on the pictures helping to resolve the interlacings of our impressions.

On the Oregon State College campus were thousands of evening grosbeaks, en route on their annual northward migration. They were feeding in the maples all over the campus, and their calls literally drowned out conversation. To us these rare and exotic birds were one of the true high spots of the trip.

We left Oregon the next morning, Thursday, May 17, having given twenty one lectures at nine places in ten days. We took the Southern Pacific Shasta Daylight to Berkeley. It was a beautiful trip, and I got a remarkably good slide of Mount Shasta from the window of the moving train.

At Berkeley we got our first real rest. The Phi Sigma chapter at the University of California is inactive, but aroused itself sufficiently to sponsor me there in conjunction with the zoology department. I hope that it may soon be completely revived. After my talks we spent Saturday in the San Francisco area, seeing at first hand all the things we had heard of and read about, and taking pictures of everything.

Shortly before we arrived, Dr. Roy Clausen had been elected to the National Academy of Science, and we were just in time to attend the testimonial dinner given to him. It was a nice occasion, and many of my geneticist friends were present.

Early Sunday morning we took the Coast Daylight for Los Angeles. This, too, is a wonderfully scenic trip. From having been cold on most of our journey, we were now rapidly approaching tropical warmth. Palm trees began to appear, and the biologist in me responded to an entirely different ecological situation.

At Los Angeles Dean Deuel of the Graduate School, and his wife, were our hosts, and delightful hosts they proved to be. We spent three very pleasant days with them, and had a fine chance to become acquainted with Los Angeles, Pasadena, and the University of Southern California. Here I gave additional lectures under the auspices of the Graduate School.

Leaving on Wednesday, May 24, for Albuquerque and the University of New Mexico on the Santa Fe, we found ourselves, by sheer coincidence, in a bedroom on the pullman which is shunted off for a day at the Grand Canyon. We spent all day Thursday at the Canyon, and although we were practically sated with scenic splendor from our preceding seventeen days, we were properly impressed in a quiet sort of way. One should really see the Canyon for the first time fresh from familiar surroundings, and with no intervening miracles such as the Rockies and Mount Rainier. Here again our pictures have been excellent revivers and integraters, and we have relived the trip by projector many times.

In Albuquerque on May 25, we were the guests of Dean and Mrs. E. F. Castetter of the Graduate School of the

University of New Mexico. The last lectures of the trip were given here, and again the officers of the chapter were most kind and efficient. And again, as in many other institutions along the way, the graduate dean and his graduate council cornered me and asked many questions. I am a graduate dean myself, you see, and we all have problems. Interestingly enough, they are largely the very same problems from school to school. I can almost predict word for word the entire discussion when two graduate deans get together.

The University of New Mexico particularly impressed us with its effective use of local styles of architecture. The pueblo architecture used on the campus and in faculty homes and fraternity houses is most pleasing and refreshing.

Leaving Albuquerque Saturday morning, May 26, we arrived back in Norman Sunday morning, after the most interesting and profitable three weeks that could well be imagined. And if I have not done justice to the kindness and efficiency of the chapter members all along the way, it is because we were so overwhelmed that we are still living with our heads in the clouds. We are most grateful to the national officers, and to all the local chapters, for making the trip possible. Many people along the way were kind enough to express the hope that this first national lectureship may become an annual event. We join in this hope, particularly from the standpoint of the speakers. We know they will have a most wonderful time. If the lectureship is continued, it should, of course, be extended to include as many of the chapters as possible.

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Classical Tradition Is Guide to Future

We who stand for the tradition of classical antiquity and its meaningfulness today need constantly to re-examine our convictions, sound though they are, in the face of thunderous inquiry and loud condemnation. Horace points a course for us when he complains of those who favor the past only because it is past. That, surely, is not our position. Rather, we see in the past that which is perennially and fundamentally of the present as well, that which is ageless, timeless. We are insistent that the greatness of the past shall be available to guide and inspire the greatness of the present and the future. And in that fuller concept of liberal education, including as it does religion and philosophy, history and modern foreign languages and literature, mathematics and the natural and social sciences, music and the fine arts—but all directed to the perfecting of man *as man*, not *as agent* of a particular calling—we look to a continuing education of young men and women as better human beings, better for God and country, for society and family and self.

The defense effort may well demand tremendous adjustments in both secondary and collegiate education, and we in the classics would be the last to impede that effort. Our whole tradition quickens us, rather, to the call of duty, to the need of sacrifice, to the high worth of contribution to the common good.

One fact remains very clear. We shall be derelict in our duty to American education if we acquiesce supinely in the complete elimination of classical studies specifically, and liberal studies generally, from college curricula "for the duration." Academic hibernation is yet unnecessary. In peace as well as in war the *studia humaniora* have much to offer, and remain still the true core of genuine and meaningful youth training. It may well be that in many instances the force of circumstance will allow a makeshift education only, and that the need for immediate utilitarian objectives will seem overwhelming. Yet wherever and whenever we can, let us keep alive the vigorous fire of genuine humane education — not alone for the youth of tomorrow, but as far as may be for the youth of this very day, so urgently subject to call in the nation's and humanity's defense.

—*The Classical Bulletin.*

THE BIOLOGIST IN PUBLIC HEALTH

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Biology, like Joseph's coat, is of many colors—or, as we might say in our own jargon, the biologist is a highly multispecific genus. Rather than attempting to catalogue its many species and varieties, I shall confine my remarks to a discussion of the taxonomy, bionomics, and ecology of the single species with which I am most familiar and which I have designated, with apologies to Linnaeus, *Biologicus salutaris*, the public health biologist.

Public health practice has come a long way since the days when tacking up placards, answering complaints about backyard nuisances, and examining school children for head lice were among its more prominent activities. The solitary, part-time health officer, not infrequently a fugitive from medical practice and almost invariably an amateur in health work, has—in many places, at least—given way to the busy, complex, smoothly-integrated combination of specialists who make up modern public health teams.

Representatives of what we may call the traditional professions of the health guild—medicine, nursing and engineering—still perform and probably always will perform the principal portion of the routine technical tasks in health departments, but many other skills in addition to those contributed by this familiar triad are now required in executing the multitudinous demands made on these organizations. Among these other competences are those of the public health biologist.

For purposes of this discussion, I have formulated a somewhat limited and arbitrary species description of this form. I have departed from the classical systematic principles which prevail in zoologic nomenclature and have based it squarely on functional rather than morphologic attributes. If we think of biology as the science of life, the knowledge of living things, we naturally think of biologists as persons versed in an understanding of living creatures, both plant and animal, their vital processes and their inter-relationships. Such broad categories of information rightly include those necessary for medical and nursing practice and many of the activities of the public health engineer and veterinarian. Without desiring in the least to exclude these good friends of ours from the professional area in which we work, let us specify that public health biologists of the type we have in mind are concerned primarily and more directly with the living organisms which cause, transmit, or reservoir human disease than they are with *Homo sapiens*, the unhappy victim of these morbid processes. While this might be considered an inclusive definition, perhaps it should be expanded even more. In the first place, it should focus not only on communicable disease but on the pain and discomfort produced by non-infectious biologic agents as well. I am thinking of the pathologic processes caused by poison ivy and comparable plants, the bites or injections of venomous arthropods or vertebrates, the allergenic pollens, and so on. Secondly, the definition should be amplified to comprehend indirect as well as direct biologic influences in the transmission of disease. Examples would be the positive or negative effect of floral or faunal associates on the larvae of mosquitoes, ticks, or mites which carry human diseases; the ecologic factors which might affect the prevalence of rabbits in spreading tularemia or of other wild rodents in maintaining an effective reservoir of plague; etc. I am well aware that such a definition tends to fray out around the edges as it approaches such well established specialties as forestry, ichthyology, herpetology, mammalogy, aquatic and terrestrial botany, and many others—but my point is that the public health biologist, or non-medical epidemiologist if you prefer a negative indication of his scope, is the best qualified member of the public health team to carry investigations and procedures into the fields of these special competences even if he does not possess them himself.

Historically, the bacteriologist was the first representative of the biologic clan to become established in operating health departments, and is probably the most prevalent one there at present. The detection and identification of disease-producing organisms or of the biologic consequences of their presence by the bacteriologist and the serologist have constituted the basic intelligence essential for the recognition and control of many communicable diseases. The last twenty years have seen the diagnostic efforts of the bacteriologist supplemented in special problem areas by those of the parasitologist, the virologist, and the rickettsiologist.

With progress in our understanding of diseases spread more or less directly from man to man, such as the common contagions of childhood—typhoid fever, cholera, tuberculosis, influenza, the venereal diseases, etc.—attention turned to another assortment of infections which require non-human but biologic intermediaries for their transmission from one individual to another. These include malaria, yellow fever, dengue, bubonic plague, trichinosis, the typhus group, some of the encephalitides, the schistosmiases, certain forms of dysentery and diarrhea, and numerous others. For the suppression and prevention of these diseases, it is necessary to recognize not only the organisms which *cause* them but those which *carry* them from man to man, as in the case of malaria and yellow fever, or those from which they may be transmitted to man, e.g., the natural reservoirs of some of the encephalitides, bubonic plague, and most of the rickettsial infections.

These necessities called for biologic skills and backgrounds over and above those of the diagnostic microbiologists. The first of such specialists to become prominent in the fields of vector identification was the medical entomologist. He has been reinforced by the arachnologist or, perhaps more properly, the acarologist and the malacologist. Similarly, the mammalogist and the ornithologist are entering public health organizations to assist in the identification of reservoir hosts. Among the late biologic arrivals to the scene of public health operations are the mycologist, whose indispensability in solving the problems of dermal, pulmonary, and systemic mycoses is already established, and the botanist interested in the pollens of common plants and weeds which cause "hay fever" in susceptible individuals.

No one knows what the outcome of the current "police action" in Korea will be as far as this country is concerned. However, we are periodically alerted by tabloid presentations or the more restrained publications of government regarding the potentialities of biologic warfare as a weapon which might be used against this country. The ability of military biologic agents to produce mass disease or destruction is probably limited; but as an artifice to arouse hysteria and reduce morale, its influence would be boundless. Furthermore, biologic sabotage or overt hostilities presumably would be considered acts of war. If either of them were the *first* act of war, it might become the basis for international conflict. Thus it becomes critically important to differentiate between the normal ebb and flow of disease prevalence and those epidemics resulting from enemy activities and to do this quickly enough so that the psychologic and pathologic effects on the public will be minimized and disastrous international complications due to false assumptions would not arise. Today intensive and unremitting reseach is being carried on to solve this problem. Bacteriologists, virologists, mycologists, pollen experts, etc., are attempting to secure more rapid methods for the quantitative sampling of "germs" in air, food, water, etc., so that continuous monitoring operations may be established to recognize the presence of any significant increase in the numbers of pathogenic agents in our environment. The identification of bacteria and viruses in a matter of hours instead of days or weeks is easily the most formidable challenge that has ever been made to diagnostic laboratories which are staffed for the most part by public health biologists.

The biologist in the operating health organiation—no matter at what level—must be something more than a taxonomist or systematist or nomenclatorial expert. He has plenty of opportunities to be all these in a modest fashion but, in addition, he must serve as an essential and irreplaceable liaison between the medical epidemiologist and the public health engineer advising both of them in relation to diseases spread to man by or from lower animals.

For the former, he must make frequent measurements of vector populations and appraise the shifting environmental circumstances which may influence their magnitudes. He must translate these trends into transmission potentials. If on the increase, these may indicate the advisability of control or preventive activities before they are evident in terms of enhanced morbidity.

Similarly, the biologist advises the engineer concerning the distribution and relative population densities of mosquitoes or mites or ticks or snails or rodents within the area to be controlled. He shows the engineer specific habitats, acquaints him with the ecology and bionomics of the vectoral and reservoir species and, with him, decides how they can be destroyed cheaply, effectively, and without harm to man, domestic animals, and useful wildlife species. By continuing vector or reservoir population studies while control activities are in progress, the biologist further assists the operations engineer by gauging the success or failure of his efforts before these can be reflected in morbidity curves.

This general pattern of utilizing biologic intelligence and evaluation has been applied in the control of malaria, yellow fever, dengue fever, sand-fly fever, various encephalitides, diarrhea and dysentery, bubonic plague, murine typhus, mite-borne typhus, Rocky Mountain spotted fever, all three types of schistosomiasis, and so-called "swimmers' itch" which results from the penetration into man of schistosome cercariae normally parasitizing water birds. Doubtless it could be applied advantageously, if it has not been done already, to reduce the prevalence of kala-azar in China, India, and the Mediterranean littoral, of Chagas' disease in Tropical America, of trypanosomiasis in Africa, and possibly of "Q" fever in this country.

In addition to assisting in public health control operations, the biologist is involved directly or indirectly in virtually every investigational activity in preventive medicine. Examples of such participation are numerous. The cytologist and geneticist have been prominent in cancer research. Physiologists figure conspicuously in ascertaining the basic causes of mental decay, of the metabolic diseases, and of the afflictions of the aged to see whether or not their effects can be retarded or nullified. The exigencies of the last war required the mass testing of antimalarial drugs, of mosquito insecticides and repellents, and of cercaricidal substances— and the determination of whether or not foreign strains of malaria parasites introduced into this country by repatriated veterans could be transmitted effectively by indegenous vectors of American malaria. The parasitologist and the entomologist cooperated effectively in making these determinations. Our troops in the Philippines faced the certainty of schistosome infections; the Schistosomiasis Commission sent out to investigate this situation was composed entirely of biologists. Because of the presence of mite-borne typhus in our Pacific servicemen, the disease was studied by the rickettsiologist, the acarologist, the mammalogist, and even the botanist was drawn into the problem as the vectoral mites rest on specific host plants, the destruction of which offered theoretic possibilities of control. The investigation of encephalomyelitis involves the clinician, the medical epidemiologist, and the veterinarian, and also the entomologist, the acarologist, the ornithologist, and even the protozoologist as the presence of certain species of avian malaria parasites, whose vectors are known, seems to be at present the only way of obtaining an index of the relationships of those vectors and hosts. The essential epidemiology of jungle yellow fever in South America is a splendid example of cooperation among clinicians, verologists, entomologists, mammalogists, and ornithologists. Before the detailed epidemiology and epizoology of psittacosis and ornithosis are known, it seems probable that ornithologists and arthropod specialists will make definite contributions to the subject. Research on the determination of the role of the fly, if any, in the transmission of poliomyelitis is held up for the present pending the accumulation of more information concerning the taxonomy, ecology, and bionomics of flies, probably the most prevalent of man's insect associates! These instances could be multiplied indefinitely, but the examples above indicate the essential place of the biologist in public health research in the past, present, and future.

Before concluding this roster of the activities of public health biologists, tribute should be paid to those individuals who dispense knowledge concerning these subjects. Nearly all of our schools of public health and some departments of preventive medicine or biology in medical and engineering schools and in universities give courses in medical parasitology and entomology. Some offer instruction in mammalogy, especially of the rodents. These teachers also belong in the ranks of the public health biologists. Many of them are assisted in their presentations by audio-visual training aids—film strips, movies, slides, etc. The preparation of these materials requires the skills not only of artists and experts on photography but of the public health biologist who is responsible for the scientific accuracy and adequacy of the finished product.

Thus we find the public health biologist in the laboratory and in the field, in the classroom and in the darkroom, active in peace and in war—hot or cold, at home or abroad, working independently or in cooperation with the medical man, the public health veterinarian or the sanitary engineer, doing basic or developmental research, exploring health problems, or measuring progress in the prevention of disease.

In closing this brief discussion of *Biologicus salutaris*, I must emphasize that I have by no means exhausted the subject. I have merely sketched its more salient aspects in order to point out that for those of you who have yet to determine the final direction of your careers, who wish to serve humanity on a collective rather than on an individual basis, who are interested in preventing disease rather than in curing it, a vast variety of satisfying opportunities awaits you in the field of public health biology.

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The Scholar's Stand

What is the scholar's duty? Not, I am persuaded, to practice a fugitive and cloistered virtue; but neither do I believe it to be that incessant appeal to the public mind represented by the reappearance of the same sets of names on a score of petitions, letterheads, and statements of causes.

Yet there comes a time when the conscientious scholar must announce his stand; and when he does so, he must speak as a scholar—that is, with the courage of one who has assimilated knowledge to intellect. When he does so, it is the duty—alas, how often evaded!—of the institution he serves, and of its graduates, to applaud his courage and to proclaim his patriotism, even though dean and president and alumni and governing boards disagree with his utterance. For, indeed, if we insist upon stifling the individual voice, if we demand a total and timid acquiescence in whatever mood or political fashion the current administration in Washington desires, how shall we eventually differ from those nations we desire to overcome?—Howard Mumford Jones, in *The Journal of Higher Education.*

OPPORTUNITIES FOR RESEARCH IN TROPICAL BOTANY AT MAYAGUEZ, PUERTO RICO

By Carl D. LaRue

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There are numerous areas not far distant from the United States which are suitable for the observation of and the collection of tropical plants, and for ecological studies on such plants. However, there are not many stations within easy reach which furnish an abundant and diversified flora as well as good laboratories for experimental study of that flora. The Federal Experiment Station at Mayaguez, Puerto Rico is one of the most accessible of places which fulfils the above requirements.

The possibility of my working there was first presented to me by Dr. Thomas J. Muzik, a member of the staff of the Station, and a former doctoral candidate under my direction. As a result I spent the period from February to June 1951 there and found the facilities excellent.

The Station is housed in a beautiful building which is surrounded by extremely fine grounds in which are planted a great number of tropical plants of interest because of their beauty, their morphology, or their economic importance.

On the grounds are extensive lath houses for vanilla studies and a number of glass houses for experimental work. There is also a large seed house for the preservation of seeds at suitable temperatures.

The bamboo collection is notable and is certainly one of the most varied and extensive in the Western hemisphere.

The plantation of *Hevea brasiliensis* is extensive for an area in which rubber is not being grown commercially, and numbers of other species of found rubber-producing plants are found.

Tropical fruits are unusually well represented. For example there is a very extensive collection of mangos, and a number of vigorous trees of the mangosteen; that unsurpassed fruit so rare in the western world. There is also a large collection of spices.

Outside the cultivated and labeled collections of the Station, great numbers of wild plants offer themselves for study. Mangrove swamps are found within a few miles, and many small areas of wild forest are found in the near-by mountains.

Sugar-cane is the most important crop in the island and is often seen on slopes which appear too steep for cultivation. Pineapples are grown commercially; grape fruits are abundant and excellent, and the oranges are cheap and of the finest flavor of any I have tasted in either the Eastern or the Western hemisphere.

The Station is directed by Dr. Kenneth A. Bartlett whom I found cooperative to an unusual degree and the same may be said of his staff of investigators. These men are carrying on a very interesting set of researches on tropical agriculture and horitculture.

The Station has good facilities for work in the physiology, anatomy, morphology, cytology, and pathology of plants. I found it very satisfactory for work in plant tissue culture and experimental morphology.

The Station with its staff of 20 or more scientists has been of great service to the island of Puerto Rico; an evidence of this is the director's residence, which was presented to the Station by the Insular Government in gratitude for the introduction and development of sugar canes which combined high resistance to mosaic with high sucrose content. These canes helped to save the sugar industry of Puerto Rico.

Numerous other achievements have been credited to the Station during World War II and the years since.

These include methods of testing the potency of Derris roots by spectrometry and the bio-assay of rote-non-bearing plants by the use of guppies. Important research was done on the growing of cinchona species and a simple and rapid method of testing the alkaloid content of cinchona was developed. Special varieties of sweet corn have been developed for the tropics, and new and important forage crops have been introduced and improved. These and numerous other results testify to the industry and ability of the staff of the Station, which is now carrying on an extensive program of basic research, as well as on such practical problems as the improvement of food crops, insecticides, drugs, forage crops, weed control and plant introduction and propagation.

During my residence at the Station I worked on a number of problems and collected material for work on a number of others. These ranged from grafting in bamboo to observations on the effect of the miracle fruit, which when chewed makes sour substances taste sweet for some time thereafter. Some of the problems, which number 15, are of interest rather than importance, but they offer an indication of the great number of possible investigations in experimental morphology which confront one in that place.

Puerto Rico can be reached most rapidly and economically by airplane. Passage by ship is considerably more expensive, and even on freighters, on which berth can be secured occasionally, the cost is more than airplane fare.

The climate is excellent from October until May. During the summer the temperatures are lower than those of many, perhaps most, tropical regions, but they are somewhat oppressive at times.

Spanish is very useful in Puerto Rico, but not essential. Nobody should be deterred from travel and study there by fear of difficulties with language. A very large number of Puerto Ricans speak good English and one is very seldom out of reach of someone who can act as an interpreter when need arises.

Second Language Seems Essential

Ideally, some knowledge of a foreign tongue should be required of all graduates of a liberal college. At the undergraduate level, this requirement could not be defended on instrumental grounds, as a tool of scholarship or professional training; undoubtedly there are subjects which can be profitably studied at this level without knowledge of foreign languages. For general education, however, a second language seems essential. The mere realization that there are other ways of saying things, just as vivid, efficient, and natural as our own, contributes immensely to detachment and breadth of view, to the weakening of intolerance and parochialism. The nature of language, surely the greatest of human inventions, can be only dimly and superficially understood without the control provided by some knowledge of another tongue. And half the beauty and power of our own speech is lost, unseen and unusable, to those who know no other language. To know only one's native speech is to be caught in a cage, condemned to limited vision and incomplete understanding. — *Report on the Curriculum,* U of Oregon.

The Spoken Approach

Cornell University has adopted the "Spoken Approach," or Army, system of language instruction as a permanent part of its curriculum. The experimental program was underwritten for five years by the Rockefeller Foundation. Most of the undergraduates have been able to meet the university's language-proficiency requirements after the first year. A $20,000 modern language laboratory given to Cornell by the Gray Research and Development Company has enabled the university to turn out large quantities of authentic foreign language records, which have become increasingly important in the intensified method.—*Science.*

THE GRADUATE STUDENT AND THE BIOLOGICAL LIBRARY

By A. James Haley

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The lack of adequate undergraduate training in library research is a severe handicap to many first year graduate students. Occasionally this unfortunate circumstance can be traced to the student's failure to assume certain responsibilities concomitant with his aspirations to become a biologist. More often, the lack of proper instruction is reprehensible.

Most undergraduate students in the biological sciences have a relatively narrow concept of the department library. Perhaps it is simply a quiet place to study or even, in rare instances, a welcome source of supplementary reading material. More likely, it is regarded as an endless stack of books to which the student is occasionally driven to prepare a term paper or grind out an assigned reading. The current literature embodied in the periodicals is non-existant for the undergraduate. This is the superficial static concept of the library carried away with the student at graduation, or even worse, carried on to graduate school.

Upon commencing graduate study the student invariably is called upon to consult the current biological literature. Indeed, this medium may constitute the major source of the subject material in certain advanced courses. Furthermore, an extensive survey of pertinent biological publications is a necessary prerequisite for undertaking any research problem. It is not surprising that the neophyte graduate student often feels like he has been thrown in the river without first being taught how to swim. This dilemma can be greatly alleviated, if not eliminated, through the development of proficiency in the techniques of library research on the undergraduate level.

The following suggestions are offered as possible approaches to the problem: 1) Lecture time should be devoted to discussing the purpose and value of the biological library. 2) A well-planned instructional tour of the department library is helpful. 3) The preparation of short research papers is stimulating and helpful—not only as training in library work, but also in providing an opportunity to write; an experience that will be of considerable value in the subsequent preparation of a thesis manuscript. 4) Carefully selected readings in the periodicals should be assigned. 5) The preparation of a limited number of abstracts of interesting scientific papers, coupled with occasional oral reports based on the same has many values. The preparation of abstracts requires mastery of the techniques of analysis, digestion, and organization. Oral presentation of the material encourages discussion and leads to a clearer understanding of the concepts in question. Activities of this type promote original thinking.

There are other benefits to be derived from introducing the undergraduate student to current biological literature. Perhaps outstanding in this respect is the contact established with the dynamic frontiers of biological research. The pulse of current investigation is brought right into the classroom.

The development of a well-rounded concept of the biological library as well as the acquisition of proficiency in the techniques of libarary research are essential components in the training of a biologist. The first year graduate student whose undergraduate regimen was adequate in this respect can meet the requirements of detailed library research with confidence. The intimate association with current biological literature, entailed by advanced work, can be assumed more easily and naturally.

"THE MOST IMPORTANT GAME SPECIES"

By J. H. Jenkins, *Instructor*

Wildlife Management, Forestry School, University of Georgia

Our cottontail rabbit seldom inspires hunting legends such as those we hear about the big gobbler of Dead Man's Swamp, or the phantom buck on Nimblewill, but "Bugs Bunny" more than makes up for these qualities by his availablity throughout Georgia. No devotees of the sporting world are more numerous or rabid than those who enjoy hunting the furry bit of chain lightning ahead of golden voiced miniature hounds. It is hunted more intensively and by more hunters throughout the United States than any other animal. In many states, it is the number one game animal.

In a recent survey by Remington Arms on what happens to the shotgun shells that are sold, it was found that 29.6 percent were used by rabbit hunters. Squirrel hunters and quail hunters used about 14 percent each. The trap and skeet enthusiasts used 12 percent with other miscellaneous game trailing. Many state conservation departments have recognized their responsibility to maintain ample stocks of the lowly cottontail (*Sylvilagus floridanus*) and have sponsored fundamental research on the species. Allen, 1938, did pioneering work on rabbit populations using the trapping and tagging method in Michigan. This was closely followed up by heavy hunting to determine the percentage of marked rabbits in the population and the theoretical population. He found that under conditions of excellent cover and sufficient natural food up to about 65 percent of the rabbits on his experimental area could be harvested without jeopardizing his next year's crop. Most other eastern states have carried out some type of research on the biology and management of the rabbit. At the present time, we have a graduate student working on the life history of the "canecutter" (*Sylvilagus aquaticus*) in the Piedmont. Comparatively little is known about this large swamp rabbit.

Although it is not generally recognized, we have at least three separate species of rabbits: the universally available cottontail; the big canecutters of the swamps in the Piedmont; and the smaller, darker marsh rabbit (*s. palustris*) of the wetlands in the Lower Coastal Plain. The New England cottontail, (*Sylvilagus transitionalis*) often called "woods rabbit," is found sparingly in extreme northwest Georgia—it is also dark and may be distinguished by a black patch between the ears. The vast majority of rabbits taken are, however, the common cottontail.

Beagles should certainly be used to get the maximum sport out of rabbit hunting here. In the North they are often hunted by simply tramping the brush and "kicking" them out— a losing proposition in the well covered Southeast. In the West, they are often shot with rifles from a car window, a method both illegal and with nothing to recommend it here.

With a good pack of beagles in full cry the sport takes on real color. Field trial beagle men seldom bag a rabbit, since for them, as with the fox hunter, the sport is in the chase, rather than the kill. Beagles now vie with bird dogs in value and esteem. Top beagles have been known to sell for more than one thousand dollars right here in Georgia.

Rabbits like all other animals need food and cover to survive and multiply. Four litters per year are not uncommon here with the litter size averaging about four or five. With this potential it is easy to see why "on the land" game management such as provision of multiflora rose hedges, ungrazed briar patches, stone piles and brush piles interspersed with winter cover crops can increase rabbits about five fold over the number found on overgrazed pastures and open pinelands. In general, much of the Southeast has plenty of cover due to adequate rainfall and a land use pattern which leaves many steeper areas in permanent cover. Providing additional cover in the way of brush piles, heavy briar patches and the like, on unused lands can help out, particularly on beagle club lands where unusually high populations are desired.

Rabbits feed on almost all types of succulent vegetation including buds and bark of a variety of trees. Winter foods such as winter wheat and rye in small numerous patches have been tried with success on intensively managed areas in other states. Truck farmers and orchardists often use repellants to ward off rabbit damage where they are too abundant. Goodrite Z.I.P. put out by the Goodrich Chemical Company has been successfully used as a repellant.

Rabbits are sedentary "critters" and rarely move over a mile from their birthplace, often spending their lives in an area less than ten acres in extent. For this reason, large refuges for rabbits are hardly feasible since so few would stray out of the area. Since the reproductive rate is so high, a greater percentage can be harvested than in most game species without endangering them.

Legal hunting methods such as with gun and dog seldom result in such heavy kills that rabbits are nearly wiped out. Importation of rabbits from other states can not be justified since several studies have shown that these displaced animals survive only a relatively short time after the necessary long confinement and shipping to a new alien environment. The danger of importing new diseases and parasites under these conditions is real and we know of no place in the southeast where rabbits are at such a low ebb that additional breeders are necessary. Some releases may well be justified on beagle trial grounds just previous to a trial since unusually high populations are necessary for the proper functioning of these events.

How many rabbits do the hawks, owls, and foxes eat? Admittedly, they take some, but innumerable studies in neighboring states have shown that a piece of land will support a given number of rabbits and when this is exceeded that surplus will be lost either to hunters, predators, or disease. Most of the commoner predators here take many cotton rats, which may well be predators themselves on nestling rabbits. Most hawks and owls more than earn their keep in this respect. Foxes are known to be serious predators on rabbits when snow cover makes small rodents unavailable. Snow cover is a minor consideration here. Fox predation is probably not serious except under conditions of very high fox populations; a condition which Georgia has apparently just passed through in the last few years.

How serious is "rabbit fever" (tularemia) in Georgia? Well, it can be serious if you are one of those cases. Ticks transmit it from rabbit to rabbit and it is a fatal disease for them. Cold weather hunting materially reduces the chances of contracting it since the ticks are dropping off into hibernation during cold weather and the infected rabbits die in about 10 days leaving a relatively disease free population until spring.

Several northern states have nearly eliminated human cases by the simple expedient of dropping the season back after several frosts. Unfortunately, life isn't that simple in this area. I have checked rabbits here in midwinter and they often are still carrying a few ticks. However, in the past few years with the advent of streptomycin and aureomycin, both efficient drugs as far as tularemia is concerned, much of the worry regarding this once dreaded disease has lessened. In 1949 we had only 77 cases reported in Georgia and we have over one-third of a million hunters. The rules for avoiding tularemia are simple enough; use rubber gloves in cleaning, (hunters probably will never follow this one), wash hands thoroughly after cleaning, cook rabbits so that no red bloody spots are left, and throw away sick rabbits.

The rabbit picture in Georgia looks good. Given half a chance, the cottontail can increase and provide a great deal of sport for our sportsmen. It is our decision.

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Sports Not a Business

Cut out football gate receipts, as has been suggested to keep college sports from getting out of hand, and you might think you'd have to close up shop. But a review of the Hopkins Plan shows that Johns Hopkins University hasn't charged for any sports contest in fifteen years. It takes no guarantees nor percentage of receipts when it travels and gives none. Yet it will have varsity and freshmen teams in eleven intercollegiate sports this year. For how much? Fifty thousand dollars.

Johns Hopkins University budgets the fifty thousand dollars for the athletic department the same as for any other division. That covers everything, including coaching salaries—five for all sports—and an athletic director. Besides the intercollegiate teams every student is required to take a year's physical education to graduate, and there's an intramural program of sports.

The urge to make more money from football may come from the desire to pay for other sports. When football has a bad year at the gate you'll notice the first thing cut out is other sports. That's why you're bound to get away from certain standards when you have to make money at the gate. The Hopkins Plan runs sports as an education instead of a business. — *New York Times*

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Emphasis on Humanities

Haverford (Pennsylvania) College has introduced an experimental study program devoted to human values in Western civilization. Made possible by a three-year grant from the Carnegie Corporation, the new course replaces more traditional subjects in literature and the study of composition.

The program includes current American literature as well as ancient Greek works and is arranged to bring the student to consider the basic values of his own life, both as an individual and as a citizen of modern society. Each student is now required to read at least six books a semester. After class discussion of their reading, the students next write weekly papers on problems raised. They then meet with a tutor in groups of three for an hour each week, when papers are read aloud and discussed. Student writing is encouraged and evaluated, on the basis of ideas introduced, thoughful analysis and development, and clear and effective expression.

According to the Haverford officials, opening of this course arises from the belief that the humanities need to be stressed more directly in American higher education. They feel that student writing needs more attention and better instruction. The new English program is based on a study of many systems and methods used in American colleges and English universities
—*The C.E.A. Critic.*

ABORIGINALITIES

* The Aborigine.

I feel him strangely near:
  Silent we stand,
This ghost and I; as one we stare
  Over his land.

Does his dark memory share
  The soft caress
Of sun-gold on the casuarina's
  Grey-green dress;

The parrots' rainbow frieze
  Swift-flashing by;
Nights eerie with the lonely curlew's
  Haunting cry;

The thrush's call swelling
  From deep gullies;
Light glowing on the purple hills
  And green valleys? . . .

Will there come one in time
  Here to surmise
What beauty touched *my* heart,
  And held *my* eyes?

TASMANIA. A. E. STURGESS.

* * * *

"Tea Tree": As a bloke who was born in an S.A. township called Tea Tree Gully I feel qualified to swell the evidence on a variously-spelled vegetable (B. 19/7/'50). When a youngster I was always puzzled at the nomenclature of my native gully, because I associated "tea-tree" (or ti-tree) with the paper-bark *Melaleuca glomerata*, which is a northern species, quite foreign to the little township near Adelaide. Later I learned that the place took its name from a *Leptospermum*, a glorious thing that grows among moss and fern by quiet pools of brown water in the Mt. Lofty Ranges. Reaching from 12ft. to 15ft. in height, the *Leptospermum* has an extremely ornamental form and a pleasing habit of bursting into masses of white blossom in the height of summer. Since I left these parts for the land where the paperbark tea-tree struggles along dry watercourses under sun-blasted ranges, the little township has grown up and devoted itself to arboreal good works. But its imagination has run mainly to such things as *Pinus insignis;* its lovely namesake remains just a bush "out in the scrub." J. M. Black, in his *Flora of South Australia*, lists six "tea-trees": three *Leptospermum* and three *Melaleuca* species.

* * * *

"B.A.K.": "Carver's" discourse on the rabbit's ability to twitch its skin was interesting (B. 2/8/'50); but where has he been all his life if he hasn't noticed expressions in the human eye? The most sincere condolence I ever received was unspoken. I happened to be with an Italian acquaintance when news came that a very good mate of mine had been killed in New Guinea. The Italian (a naturalised Australian) could speak excellent English, but he didn't say a word; he just "looked" it. Nobody could have expressed so much so eloquently. And surely "Carver" won't deny that a man's eyes blaze when he is in a rage! The shine in kids' eyes as they undo Christmas presents—is that, too, only apparent to novelists and myself? Then there is that dreamy, far-away "penny-for-your-thoughts" look — facial muscles have nothing whatever to do with that, but nobody could possibly deny that it exists. And don't the eyes really grow misty when tears are close—or are tears merely "fictional phooey" also? At one time I lectured classes in technical subjects; there was one way, I found, to keep your finger on the pulse of a class—watch the students' eyes. The moment you departed from the golden rule "Keep it simple" mystification showed itself in the eyes of the listeners.

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* *(This entire section,—the heading, the poetry, the cartoons, and the letters, —has been reproduced from pages 12 and 13 of the 23 August 1950 issue of "The Bulletin," published weekly in Sydney, New South Wales, Australia, to which we express our thanks for its fine example of the geniality and the biological interests of average magazine readers in "The Land Down Under.")*

* * * *

"Kopi" looks back:—

Ray Mathew's verses (B. 9/8/'50) about the log hut in the pine country took me straight back to what Kipling calls "the high and far-off times," the days just before the Boer War, when the bush along the Murray was as peaceful and as little-populated as Central Australia is now. Beardy hut was on the far side of the Kopi plain, in the back-country of Paringa, situate halfway up a sandhill clad with bush-pines and ice-plant, and it looked out upon the sunrise and upon the scooped Beardy dam, known to every beast for miles around—kangaroos, dingoes and brumbies, besides the station cattle. If you lay low at night in the hut, given any sort of a moon, you could see the brumbies emerge from the scrub at night beyond the dam and stand a while gathering courage, in face of the

"Let me go, Blondie! Here comes the missus!"

hut, to make for the drink. They would dribble up, smelling the ground and snorting, suddenly throw up heads at any night sound, or one of them, stumbling on broken ground, would startle himself and the rest of the mob, and they'd turn and gallop back into the trees, to renew the manœuvre all over again. The hut was built of upright pine longs, the crevices plastered with dry pug; and the whole of one end, at the right as you entered, was given to a fireplace and chimney of limestone and pug, big enough for four to sit inside it around the fire, and wide enough, as you looked up, to see several handfuls of stars. As a youngster not old enough to enter men's company except on sufferance, I treasure the memory of some days outback there, mustering cattle in the dried-out country and droving them into Beardy, as a privileged member of a company consisting of Penny Ogilvy (lessee), "Breaker" Morant (putting in some time, as I think now, from up-river in N.S.W.), and a fleeting, here-today-gone-tomorrow sort of cove, an ex-blacksmith, useful chiefly with a branding-iron. The horses were not shod in that country. The men charged me with the job of cooking the chops and making damper for the day while they roamed Beardy paddock to bring in the horses, hobbled because of the brumbies in the adjacent scrub and the rotten state of the paddock fences. To ride all day after the store cattle, come back to the hut as the light waned and read aloud, turn-about, from Huck Finn or Artemus Ward by lanternlight after tucker till too drowsy to go on was sheer romance for this youngster, heightened now by the setting given by the years to the memories which Ray Mathew's lines awaken.

* * * *

"What's on your mind, Harry?"

"North": While "The Bunyip" (B. 26/7/'50) is instructing the locals in the delights of simple magnification, let him try this one. Capture one of the hairy processional caterpillars and mount two or three of the hairs beside a fine sewing-needle. He will then get on his screen, at a magnification of about 400 times, the image of a great, clumsy bar, rough and pitted, and coming to an obtuse, more-or-less rounded termination ("point" is not the word). Beside this monstrosity he will see two or three smooth, delicate spears, running out to infinitely sharp points on their shafts. Then he will never again wonder at the irritation that succeeds rash meddling with the hairy insects.

* * * *

"Flinders Range": If "Tarbush's" home "under the ranges" (B. 19/7/'50) is near the main northward-running scarps of S.A.'s Flinders Range there is a possible explanation of the preference shown by his golden-web spiders for webs running east and west. The watercourses that drain the Flinders run east or west into semi-desert country, where bushes of the size favored by *Nesophila* are scarce, except along the watercourses themselves. It seems natural, then, that the big spiders would spin most of their nets along the line of creeks, from bush to bush. This would mean that the chances would be all in favor of a web having an east-west axis.

* * * *

"Betcha": Because foxes often hunt in pairs, it doesn't follow that their reasoning powers are responsible for the cooperation that results in an easier catch. Even when working together it is each fox for himself, and there's no such thing as sharing the prize. The fox is no unselfish hero that goes after a young lamb and is chased off for some little distance by the ewe, thus allowing his mate to nip in from the other side and snatch the lamb. He is just unlucky in being the one spotted by the ewe. Watched a couple of foxes hunting rabbits the other day. Obviously they knew a rabbit was there, and after they'd worked together through a small patch of fern they

"*Let it go* NOW!"

travelled towards each other round the edge. Presently one spied the squatting quarry; there was a jump, a squeal, then he dropped down and consumed the catch while his mate sat a few yards off and watched hungrily. Evidently it was the boss that had made the catch, for no attempt was made to snatch a share, and only after the diner had finished and moved off did the hungry Johnny creep in to scavenge the area for stray scraps.

* * * *

"Horseless H.". Isn't the cassowary the only Australian bird credited with killing a human being? The incident occurred near Mossman (N.Q.) when two boys put up one of the large pink-and-blue-necked, glisteningly-black, helmeted birds. The cassowary took off, but their dog bailed it up against the base of a huge fig-tree. The big fowl, with a lance-like blow from the middle toe of its foot, quickly maimed the dog, and, as its owner rushed in to save it from further injury, the bird struck again. The blow caught the lad on the neck and severed his jugular-vein. He died almost instantly.

* * * *

"Old Bushman": A pet kangaroo that enjoys luxury is Cassy, a five-year-old grey doe at Battery Park homestead, Mansfield (Vic.). Each evening after dining on biscuits and milk and attending to her facial make-up in the bathroom mirror the hopper comes into the lounge, where she scrutinises all the trinkets in the room before sprawling on a huge rug in front of the fire beside a golden Labrador and a foxie. Later, when she wants to go to bed—on the doormat on the veranda—she just hops over to the door and knocks to be let out.

* * * *

"Any more o' your back-seat drivin' an' you get off an' walk!"

The Moonless Bay.

No moon; the flat sand glides
Into the gloom. The tides,
Murmuring secret sounds,
Make their unending rounds
Over the grey stone's feet;
Only the ripples' fleet
Quicksilver lines reveal
Where the dark waters steal
Into the bay. How soon
Will all be lost to noon?

Here in this very bay
I saw but yesterday
The sun's bright fingers reach
Brown shoulders on the beach,
Brown toes in silver sand
Taking their eager stand,
And saw upon the tide
Many a surfer ride,
Heard how the laughter rang—
Even the grey stone sang.

But now that sea and stone
In one dark realm are shown,
Night seems to trace a line
Sunlight could not define;
As though beneath the pall
Where shades on shadows fall
Some hidden pattern lay
Far from the naked day
And waiting, half-unfurled,
Another—unknown—world.

N.S.W. LEM.

* * * *

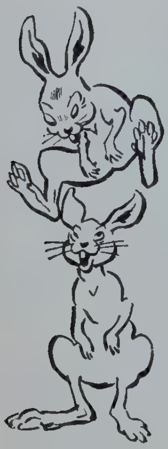
"B. A. Ker": The sorrowful-looking old bloke was carrying his swag—but he was doing it on a bike. At least, he had been until "me pedal 'it that stump near the culvert." The result was, it seemed, something had seized in the centre axle; he'd have to take the ball-bearings out, but he couldn't put them back without vaseline. Could Mum give him a spoonful? Mum produced the jar; only the faintest smear was left around the edges. Well, would Dad lend him some axle-grease? Dad would have, willingly—"If I could find it; the kids had it to grease the billy-cart and it's been missing ever since." Then Mum got a brainwave: "Would butter do?" After careful consideration Whiskers decided that butter "oughter do." He sat down in the shade and surrounded himself with bike fragments and butter-coated ball-bearings. Things seemed to be going reasonably well when Paddy returned from a ramble. Paddy was the biggest, ugliest, most ferocious-looking and best-natured canine that ever slapped a stranger across the face with his tongue. In addition, he was the greatest stickybeak in dogdom. He sighted the seated figure, pricked up his floppy ears, and, with banner held high, trotted up to investigate. Suddenly a terrible cry came from the stranger. He leapt to his feet like a madman, his pale, watery eyes protruding and his mouth working. For a shocked second he stood in silent, staring horror, then abruptly dived into howling action. Pieces of bike were hurtling around the astonished tyke when Mum came rushing out. "Don't be frightened of old Paddy!" she exclaimed. "He won't hurt you." "Frightened of 'im?" the old codger bawled. "Frightened of 'im! Who's frightened of him? The mong just et me ball-bearin's!"

* * * *

"Bo": The shed-hand was improving the Sabbath morn washing out his flannels, and voicing loud protests. "I've used damn' near a bar o' soap already an' *still* can't get a lather," he growled. "I never see such hard water!" Old Rick looked at the grizzler. "You don't call *that* water hard, do you?" he asked. "Now if you want water that's really hard you want to go up the Paroo country, where I was raised. It's so blanky hard there you gotta belt it inter shape with a hammer befory y' can drink it!"

* * * *

"Ginger": On the look-out for a survey-peg, we were coasting slowly down a sandy, little-used track when we came upon a colony of rabbits feed-



ing quietly. In the shallow gutter on the edge of the track two kitten bunnies, with amazing speed, split-second timing and apparent enjoyment, were playing leapfrog. It was fascinating to watch: as the bunny on the bank leapt over his playmate into the gutter, the one in the gutter leapt on to the bank. Too intent to notice our approach the fun waxed fast and furious until, a faint rattle betraying our presence, the gymnasts were down a nearby burrow in a flash.

* * * *

"Solitude": Seventyfiver's hat might have gone on for ever if Sandy's pup hadn't fought it in strenuous victory to a few scattered remnants. Followed suitable lamentation and redress, then the old bloke visited the store and returned shamefacedly sporting a brand-new lid. Each time I sighted him during the day I wondered vaguely who the coot was, till my ears and the next wind-puff informed me. He used the lid as a knee-pad when we sawed several logs, and at the deep soak it dipped up a drink for himself and Blue, before doing duty as a seat at tucker-time. Returning to the yards at dusk, the old bloke rubbed down his sweating nag with the headgear, carted out three hatfuls of chaff, then, replacing the chaff with a collection of bark and chips, he made for the hut. With the fire smouldering, he again grabbed the hat to fan the glow, belted the new dog with it, brought in half a hatful of spuds and peeled them in the same container. We'd just started tea when a slight thud advertised that the old bloke's lid had fallen to the floor. He eyed it in silence and disgust. "Ain't nothin' as useless as a unbroke 'at," he growled resentfully. "Still, Gawd knows they cost enough so"— He retrieved the hat and shoved it back carefully on the pile of hides. "So I s'pose a bloke better not let the thing get knocked about yet a while."

* * * *

Students Impatient with Objectivity

It is not the scholar and teacher who is in search of the truth that menaces the educational process but the teacher who contends that there is no such thing as truth but only opinion. For such a belief leads to a dogmatism that is impervious to argument and inaccessible to rational scrutiny. You can argue with a man who believes in the truth but you can't argue with a man who says everything is a matter of opinion.

The teacher has not only the obligation to present the truth of any matter as he conceives it to be but also to explain how he arrived at it. He will not insist, of course, that his students agree with everything he has said but he will let the argument and the evidence speak for itself. He will himself be receptive to counter argument and counter evidence and will encourage his students to take issue with him when they feel so inclined. The atmosphere of the classroom should be one of tolerance but not one of anarchy. To the extent that it is humanly possible, reason and not personality should dominate the proceedings . . .

The students are impatient, and rightly so, with an "objectivity" which refrains from decisions, for objectivity does not mean that we should have no opinions at all but rather that our opinions should be based upon reason and objective evidence The practical consequences of an "objectivity" which refrains from decisions have been amply documented by Julien Benda in his *Treason of the Intellectuals* and we saw in the rise of Nazism in Germany how the "objectivity" of German university professors contributed to that end.

If professors of political science have nothing important or significant to say about political policies and decisions they cannot very well complain when their students turn to demagogues for more specific instruction. —John H. Hallowell, Professor of Political Science, Duke University.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS IN COOPERATION WITH UNESCO

BOTANICAL SECTION OF THE INTERNATIONAL UNION OF BIOLOGICAL SCIENCES

INTERNATIONAL COMMISSION FOR PLANT SLIDE EXCHANGES

November 1950

PURPOSE.—For many years there has existed an acute need for some method whereby microscope slides of plants from all over the world could be made available to those needing them for any purpose. In the newly published "Anatomy of Dicotyledons" Metcalfe stresses the importance of building up reference collections of slides, particularly at every institution where taxonomic investigations are carried on. Many, if not most, such institutions lack the personnel and facilities for the preparation of slides, and there are also difficulties in the way of securing the necessary material from other regions.

The most practical method of obviating all the difficulties mentioned above appeared to be the estabilshment of an

INTERNATIONAL COMMISSION FOR PLANT SLIDE EXCHANGES, to which materials might be sent for processing and from which participants could receive in exchange any available slides that they might desire. This Commission has now been established under the auspices of the Botanical Section of the International Union of Biological Sciences in cooperation with the California Botanical Materials Company, in the laboratories of which the materials will be processed.

AIM.—The aim of the Commission is to enable cooperating institutions and individuals to build up reference slide collections by exchanging plant materials sent in by them for slides processed from either these materials or from those forwarded by others.

MEMBERSHIP AND FEES.—Any individual botanist, department of botany or botanical institution may become a member of the Commission upon payment in advance of an annual fee of ten dollars ($10.00, U.S. Currency). Fees will be used solely for overhead expenses such as the preparation of lists of slides, slide boxes, postage, clerical assistance, etc.

COLLECTION OF MATERIALS.—Members are expected to collect and fix properly for slide-making purposes plant materials indigenous to their respective regions or collected elsewhere by themselves. All plants from the algae on are to be included, as are all plant structures. The two standard microtechnique manuals should be used for guidance in collecting: Johansen, Plant Microtechnique, or Sass, Elements of Botanical Microtechnique. If desired, detailed instructions concerning specific plants may be obtained from the Chairman. Each collection should be sufficient for a minimum of 2,000 slides. A series of developmental stages is far more preferable than material all of one stage. Materials are to be shipped in fluid to the Commission, carriage charges to be borne by the shipper. Each collection must be accurately identified as to genus, species and structure, and each species should be accompanied by a herbarium voucher giving all requisite data. These specimens will be deposited by the Commission in the Herbarium of Pomona College, and will be available on loan.

EVALUATION OF MATERIAL.—Each collection, upon receipt and acceptance by the Commission, will be given an exchange value of 10 slides. Materials which duplicate those previously sent by others may be given a lesser exchange value, depending upon their usefulness.

EXCHANGES.—Members are entitled to receive in exchange any slides that they desire, up to the total of their allowances, whether these are prepared from materials sent by themselves or by others. An indication of what is desired should accompany the material and lists of available slides will be returned for selection.

OTHER INFORMATION.—The extensive slide collections of the California Botanical Materials Company, numbering in excess of 6,000 individual items, will be used as a nucleus for exchange purposes.

Slides will not be received for exchange. The Commission does not duplicate the aims or purposes of the International Depository of Cytological Slides, another member of the Union. However, one example of all cytological slides processed by the Commission will be sent to the Depository.

In return for its services and for providing the necessary supplies, the California Botanical Materials Company has been authorized by the Council of the Botanical Section of the International Union of Biological Sciences to sell, at its established prices, surplus slides of any materials forwarded to the Commission, to any who may desire them without becoming members of the Commission.

Address all communications and shipments to:

Dr. D. A. Johansen, Chairman
International Commission for
Plant Slide Exchanges
861 East Columbia Avenue
Pomona, California, U.S.A.

* * *

Teaching Stimuli

For two decades at least the growing concern about general education has brought into being an important list of curriculum studies and reports, reflecting the interest of administrators and curriculum leaders in the establishment of programs of study to accomplish more fully than before the aims of introductory, liberal education. Has general education exercised a similar influence upon college teachers? To those intimately concerned with general education the only answer possible is a strong affirmative, but the evidences and documentation for the answer are less readily available for teaching than for curriculum.

There is abundant evidence that general education courses have stimulated effective teaching through the reorganization of subject matter. These new courses are directed toward utilizing the student's natural motivation arising from his desire to discover the relationship between the story of the past and the overwhelming problems which seem to beset him and the current civilization in which he lives. Furthermore, the student's attention to such subject materials is directed specifically toward their significance in his life as a citizen, a parent, a voter, a human being, rather than as one concerned only with professional and vocational techniques.

The teacher of such courses has had to take a new look at subject matter, a look which has included consideration of the students for whom the subject matter is intended. A course designed for the general education of students as a part of a total pattern, reviewed, criticized, and finally approved by a committee or staff including representatives of the humanities, the sciences, and the social studies, is a course predestined to more effective teaching and to more than usually satisfactory outcomes.—Robert C. Pooley, U. of Wisconsin.

EDITORIALS

Foreign Biology

A meeting of biologists and others interested in the condition of the biological sciences in the countries behind the iron curtain was held during the recent sessions of the American Association for the Advancement of Science in Philadelphia. Much of the reported session took on the combined flavors of an indignation meeting and a wake.

"Nature" (10 March 1951) complained that the supply of biologists is rapidly exceeding the demands in Great Britain, and suggested, among other remedies, either raising the standards of admission to biology departments or diverting the stream of candidates into research management or administration. All of which is very interesting and might have been impressive if the same magazine had not come out with a very revealing article in its 18 August 1951 issue entitled "Biology in Education."

Apparently the British Association for the Advancement of Science set up a committee sometime back to "consider the position of biology and rural science in the school curriculum and matters relating thereto." Questionnaires (they have them in Churchilland too!) were sent to the university departments of education and to the teacher training colleges. We quote verbatim the pertinent summary of the report as it appeared in "Nature":

"Among other findings the committee reports that in secondary modern schools biological work varies from total neglect to a few very good courses based on gardening, etc.; and that in these schools there is a grave shortage of keen, well-qualified teachers. Laboratory work is neglected. In the secondary grammar schools it finds again a serious shortage of well-qualified teachers, though the number with general degrees, or no degree, who teach the subject is increasing. If general science is offered, it is almost always in the hands of non-biologists, and biology is omitted. Out of forty-nine teachers' training colleges from which replies have so far been received, nineteen offer no courses in biology; and including all colleges together, only about 10 per cent of the entrants take biology. Both the quality and quantity of biology entrants are falling off. There is also evidence that students avoid biology since too academic a school training has prevented development of interest in the subject."*

This situation should give us no cause for gloating. Anyone acquainted with the meticulous thoroughness of British biological education would sympathize with young Britons who would be relunctant to enter the teaching profession.

Ecologists will welcome the next suggestion of the committee:

"To remedy this state of affairs it is felt by the committee that the vicious circle of the too acadamic approach must be broken in the universities, and that this can be done by much greater stress on field-work. The greater emphasis on the teaching of practical ecology, now apparent in the universities, is therefore, it considers, to be welcomed."

To us here in smug America this statement comes as a distinct surprise: "In comparison with such subjects as history and literature, and even chemistry and physics, biology is playing a minor part in education."

Yet another surprise follows hard on the heels of the first: "During recent months more than one biologist of considerable experience has publicly admitted that he can see no special educational value in biology."

After this, the editorial conclusion has the anticlimatic value of a typical British understatement: "Besides constituting a question of extreme educational importance, this state of affairs is an anthropological situation of absorbing interest."

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*"Nature," Vol. 168, No. 4268, August 18, 1951, Macmillan & Co., Ltd., St. Martin's Street, London, W.C.2., England.

The Editor of "Nature" offers as a solution renewed emphasis on field studies and on health education: "A new conception of the educational mission of biology has begun to take shape which has come to be called social biology."

After some discussion of this movement, the editorial concludes in a very quotable and stimulating paragraph:

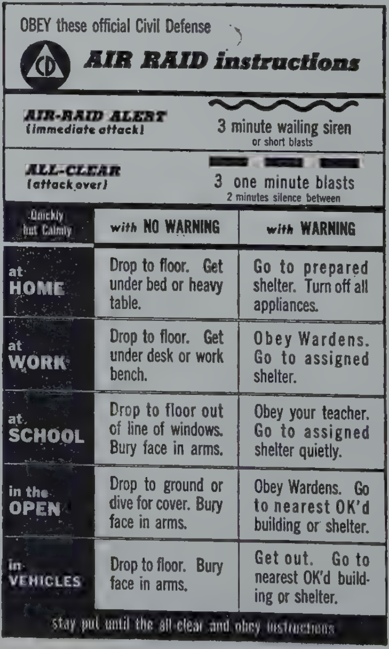
"The movement towards social biology in the schools calls for a similar movement in the universities, where at the present time departmental specialization may foster sectional efficiency but at grave risk of failure to visualize the greater whole. Yet just as the educational process extends from the cradle to the grave, lines of interest should run all the way down from the research worker to those stock figures, the man in the street and the woman in the home. Only with this wider vision does it become clear that in human progress science is fundamental, and that there can be no genuine progress without the understanding that studies of living matter alone can provide; for many of the problems that beset the world today, whether personal, social, communal or international, social, moral or spiritual, are essentially biological. It is a vision of this nature that is required to fire the imagination of a larger proportion of the more gifted minds among us; for these minds, particularly, need to have the ideals of truth, goodness and beauty presented to them in forms which are directly applicable in human life and associated with the main interests and strivings of humanity. Such a vision would accord to biology in the schools the status it now so sadly lacks, while at the same time solving the related problems of the poor supply, and frequently meagre attainments, of those who study and teach the subject."*

Cooperation for Defense

The Federal Civil Defense Administration, which is charged with all the preparations for war at the civilian level, publishes an interesting little magazine called the "ALERT." It is well worth study.

Everyone hopes that all that "ALERT" implies and connotes will never be needed, but no one can be such an ostrich as to be certain it won't. Every veteran of the last two wars or of the present "police action" in Korea who has seen a bombed-out town would go to almost any length to prevent its happening in our own country. That is only wishful thinking. If war does come to the United States sooner or later, it is imperative that the civilian mind is conditioned for it. France in the 1930's was not ready. Britain was. Britain suffered more, but Britain survived, with honor.

The September 1951 "ALERT" featured the civilian pocket alert card shown here.



OBEY these official Civil Defense

AIR RAID instructions

AIR-RAID ALERT (immediate attack)	3 minute wailing siren or short blasts
ALL-CLEAR (attack over)	3 one minute blasts 2 minutes silence between

Quickly but Calmly	with NO WARNING	with WARNING
at HOME	Drop to floor. Get under bed or heavy table.	Go to prepared shelter. Turn off all appliances.
at WORK	Drop to floor. Get under desk or work bench.	Obey Wardens. Go to assigned shelter.
at SCHOOL	Drop to floor out of line of windows. Bury face in arms.	Obey your teacher. Go to assigned shelter quietly.
in the OPEN	Drop to ground or dive for cover. Bury face in arms.	Obey Wardens. Go to nearest OK'd building or shelter.
in VEHICLES	Drop to floor. Bury face in arms.	Get out. Go to nearest OK'd building or shelter.

stay put until the all clear and obey instructions

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*"Nature," Vol. 168, No. 4268, August 18, 1951, Macmillan & Co., Ltd., St. Martin's Street, London, W.C.2., England.

Any responsible institution or person who will engage to spread the card and its intelligent use may secure copies of the "mat" for its reproduction by any print shop. Simply address: Chief, Publications Branch, Federal Civil Defense Agency, Room 716, Rochambeau Building, Washington 25, D. C.

APOLOGIES!

"I mixed those babies up. However could I do it?"—Buttercup's Song, in "Pinafore."

The Editor's apologies are due to The Miami Marine Laboratory, Florida, —to The University of New Hampshire's Summer School, to the printers of this magazine, and to all the readers of the May 1951 "Biologist," for unwittingly exchanging the cuts of the respective schools, so that the Miami Laboratory exhibited some very classic New England colonial buildings, and New Hampshire blossomed out in Floridean tropical architecture and lush vegetation. es, the mistake was called to our attention by exactly two (2) correspondents,—A. J. Haley, President of Phi Chapter, New Hampshire, and the Rev. Dr. P. H. Yancey, S. J. Editor of the "Mendelian of the Biology Department of Spring Hill College, Mobile, Alabama. Thanks, gentlemen!

Keeping up with Biological News

Elsewhere in this issue is a thoughtful contribution on the use of the biological library by graduate students. One who has cut his teeth on the background literature to any biological problem might well question the propriety of publishing such a contribution at this particular time in our particular journal.

Our answer must, as always, be that no matter how highly organized the processes of research may be in some institutions, in others the diametrically reverse may be the case. This country has not yet gotten to the dead-level of educational mediocrity which, we begin to suspect, characterizes what college life may remain behind some of the foreign curtains, iron or otherwise.

In our graduate student days the department in which we were doing our stint of instructional fellowshipping and doctoral thesising made it very plain that all major students should keep abreast of the latest developments announced in the botanical periodicals. Just to be sure about it, our department had a journal club which met at a different professor's home every month, sometimes semimonthly. Some of us cub instructors got together and hosted the department at the University Club or at one of the other fraternity houses in which someone claimed membership. Simple refreshments were the closing order of the evening, but the mental stimulants we picked up in our journalistic botanizing were prodigious. There was a faculty-graduate student committee which assigned the journals to be reviewed and the reports ran from brief summaries of interesting but unimportant announcements all the way up to twenty minute discussions of important papers or trend-changing contributions.

It is a curious fact, but that periodical indoctrination has stuck with most of us who stayed in the field than a lot of the more technical and important research papers we consulted, abstracted or quoted in our seminars and doctoral thesis research. Perhaps it was because the contemporary research fired our imaginations more than the intellectually embalmed specimens of ancient research which we had to excavate from the dusty shelves of the biology library.

So even today we cannot resist the weekly issues of "Science," "Science News Letter" and their very estimable British counterpart, "Nature." Through this illuminating trilogy we keep at least reasonably informed. When the more weighty professional magazines come onto our library shelves, we know what to expect and where to look for more extensive treatment of newly announced developments.

NEW BOOKS

This section offers brief uncritical reports on the general content of recent publications in biological and related fields. For quick location on library shelves, each notice will be preceded, wherever possible, by three groups of numbers, the first two of which will be the Dewey and the Library of Congress classified numbers respectively. The third group is the L.C. card number, for the convenience of Librarians.

ADVANCES IN GENETICS, edited by M. Demerec*; Academic Press, Inc.*, 125 East 23rd St., New York 10. N.Y.; 1951, 343 pp., test figs., tables, etc., $7.50.
QH431.A1A3 575.082 47-30313

Volume 4 in this series includes papers on the mouse by Gluecksohn-Wallsch; lethal factors in Drosophila by Hadorn; heterochromatin in Drosophila by Hannah; genetics of coffee by Krug and Carvalho; vertebrate chromosomes by Matthew; linkage in rice by Nagao; cotton breeding by Richmond; duplication in evolution by Stephens and orthopteroid insect genetics by White.

ALGAE OF THE WESTERN GREAT LAKES AREA, by Gerald W. Prescott; Cranbrook Institute of Science, Bloomfield Hills, Mich.; 1951, 946 pp., $10.50.
Q11.C95 589.3 51-12742

This is a considerable handful of algological information, with a 13-page glossary, a 50-page bibliography, 136 plates, and a 12-page index. The first sixty pages are devoted to ecological considerations. The rest of the book is taxonomic. The illustrations are large and clear.

THE AMERICAN OXFORD ATLAS, by C. Lewis and J. D. Campbell, Oxford University Press, 114 Fifth Ave., New York 11, N. Y., 1951. $10.00.

This is a magnificent compilation of 80 new maps based not so much on the economic or political as on the physical features of the regions. There are also 24 pages of distribution maps. There are none of the typical state-by-state divisions. The United States, for instance, is covered by the following areas: New York, Chicago, Southeastern, Middle West, and Far West. The Great Lakes are figured with contoured depth lines. The ill-famed 38th parallel is featured in Korea. We missed Mona Passage between Santo Domingo and Puerto Rico. We are also surprised that, evidently, old sources were used for the mapping of Australia. The old stock routes from the Northern Territory cattle lands down into the more populous southeastern consumee areas could by no stretch of the imagination be designated as "passable, all weather." Most of them should be designated as "track or pack roads." The Leichardt Defense Highway — better known as Australia's "Burma Road," which was hurriedly constructed in 1942 between the southern terminus of the Darwin-Birdum N.T. line and the northern end of the Alice Springs-Adelaide S.A. Line—was, and we understand still is, an all weather road, but does not follow the old Overland Telegraph route given on the maps as we used to travel it. There is no indication at all of its eastern branch from north of Tennant Creek, N.T., to Camooweal, Qld., through Avon and Rockhampton Downs.

ANATOMY OF THE CHORDATES, by Charles K. Weichert; McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y.; 1951, 921 pp., Illustrated, $8.00.
QL605.W4 591.4 51-7958

For those who are interested in a practical as well as an entirely *new* textbook for vertebrate anatomy, Dr. Weichert's volume should be inspected thoroughly. Although based on the marine lamprey, the spiny dogfish, the mud puppy and the cat as dissection matter, the author has wisely left the detailed discussion of these animals until late in the work. After three preliminary chapters devoted to a review of phylum Chordata, the author devoted the ten main chapters of his book to the vertebrate organ systems. The 68-page index is unusually comprehensive.

AVIFAUNA OF MICRONESIA, by R. H. Baker; Exchange Desk, University of Kansas Library, Lawrence, Kansas; 1951, 359 pp., 16 text fig.
QH7.K3 598.29965 51-62489

Too little is known of the variations among the fauna and flora of the Pacific Islands which were so thoroughly invaded at such cost in lives and money during the second World War. This work is the result of Rollin H. Baker's service in 1945 as a member of the staff of the Laboratory of Mammalogy of the United States Naval Medical Research Unit No. 2 (NAMRU2). The area studied includes the islands comprised in the old post-World War I Japanese mandated territories, i.e., the Palaus, Marianas, Carolines and the Gilbert Islands.

BACTERIAL PHYSIOLOGY, edited by C. H. Werkman and P. W. Wilson; Academic Press, Inc., 125 East 23rd St., New York 10, N. Y.; 1951, 707 pp., illustrations and diagrams, $8.50.
QR84.W58 589.95 51-8141

The impressive list of 19 collaborators and contributors to this volume is too long to be individually enumerated here. The chapter cover, among other topics, lists: the bacteria considered chemically, structurally, genetically, anabolically, nutritionally, oxidationally, functionally, catabolically and luminescent.

BACTERIOLOGY, by R. E. and E. D. Buchanan; The Macmillan Company, 60 Fifth Ave., New York 11, N. Y.; 1951, 678 pp., illustrated, $6.00.
QR41.B75 616.01 51-11490

This first printing of the new fifth edition of the well-known "Buchanan" text has been designed to pack as much of the rapid advances of modern bacteriology as possible into one convenient classroom text. The last appendix with the habit illustrations of 81 common molds is as helpful an idea as are the keys to the bacteria and the yeasts in the two other appendices.

BIOCHEMISTRY OF FERTILIZATION AND THE GAMETES, A Symposium; Cambridge University Press, 51 Madison St., New York 10, N. Y.; 1951, 66 pp., $2.25.

The paper-bound report of a symposium in which A. U. Smith contributes a paper on mammalian fertilization in vitro; T. Mann in mammalian semen; C. Lutwak-Mann on male hormones and nutrition; G. I. M. Sawyer on hyaluronidase and fertilization; Lord Rothschild on interacting substances and metabolic sperm-egg changes; and L. E. Hawker on biochemistry of sexual reproduction in plants.

THE BIOCHEMISTRY OF FISH, A Symposium; Cambridge University Press, 51 Madison Ave., New York 10, N. Y.; 1951, 105 pp., $2.75.

This paper-bound symposium report contains the contributions of: E. Baldwin on the comparative aspects; G. Homoir on proteins; J. Shewan on nitrogenous extractives; J. A. Lovern on fats; T. W. Goodwin on carotenoids; G. A. D. Haslewood on bile salts; and C. L. Cutting on economic utilization of fish.

THE BIRDS OF WISCONSIN, by L. Kumlien and N. Hollister, revised by A. W. Schorger; Wisconsin Society for Ornithology, 4333 Hillcrest Drive, Madison 5, Wis.; 1951, 122 pp., paper $2.00, buckram $2.75.

Reprinted from "The Passenger Pigeon," in which it appeared in 1948-51, this is the revised edition of the bulletin which first came from the original authors in 1903, whose pictures appear on the first page as a frontpiece. There are no diagnostic characters. The list is made up of all the birds which nest in or migrate through the state. Under each species there is a paragraph listing the places where it has been located.

THE BRIDGE OF LIFE, by Augusto Pi Suner; The Macmillan Company, 60 Fifth Ave., New York 11, N. Y.; 1951, 270 pp., $3.75.
QH308.P463 574 51-9646

Reading this absorbingly interesting

volume, one is reminded of Alexis Carrel's "Man, the Unknown." Dr. Pi Suñer has stated his philosophy of life for all to read, if not to appreciate or understand. It saw its origin in a series of lectures delivered at the University of Caracas and was later published by the Venezuelan Government under the title: "The Beginning and End of Biology." The "bridge" as the author conceives it is biology, which "begins with the study of physics and ends in metaphysics." The tremendous range of the author's knowledge and his skillful weaving of recent developments into a coherent picture make this a challenging bit of scientific orientation.

THE CHROMOSOMES, by M. J. D. White, a Methuen Monograph; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1950, 124 pp., 21 fig., $1.50.
QH605.W 576.3623 A51-5181

Published originally on 4 November 1937 in Great Britain, this pocket-sized monograph is made up of six chapters: the resting nucleus, the general outline of mitosis, special problems of mitosis, the outline of meiosis, special problems of meiosis, chromosomes and evolution. There is a glossary and a 195-item bibliography.

CLOUD PHYSICS, by D. W. Perrie; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1950, 119 pp., 30 plates, $4.50.
QC921.P4 551.57 51-9779

The author is engaged in research on the meteorological aspects of forestry with special emphasis on forest fires. This work, therefore, will appeal to all students of forestry, ecology and water engineering, as well as to all professional and civilian aviators. This is the best presentation of the subject yet.

COLLEGE ZOOLOGY, by R. W. Hegner and Karl A. Stiles; The Macmillan Company, 60 Fifth Ave., New York 11, N. Y.; 1951, 911 pp., 473 fig., $6.00.
QL47.H52 590 51-5644

This sixth edition follows the general plan of its famous predecessors, but has been enriched by more than 300 new illustrations as well as new line drawings. The cat has replaced the rabbit as the major mammal studied. New material has been added on animal physiology, Rh factors, neurohumors, radioactive substances, and so forth.

QL101.H48 591.9 51-12300

COMMUNITY HEALTH EDUCATION IN ACTION, by R. S. Patterson and B. J. Roberts; C. V. Mosby Company, St. Louis, Mo.; 1951, 346 pp., 34 fig., $4.50.

This is a textbook for health education. As such, it is designed for the interested general public, for nurses or sanitarians, and for health educators. There are seventeen chapters on various techniques of popularizing health facts and three appendices contributed by outstanding health educators.

CYTOLOGICAL TECHNIQUE, by John R. Baker, A Methuen Monograph; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1950, 211 pp., 3 diag., $1.75.
QH231.B 578.9 A51-8166

The third edition in Methuen Monograph pocket-sized form of a very interesting book, in which among other things we find for the first time a program of study on the killing effects of certain standard fixatives, based not on material to be sectioned and studied but on ordinary crude or bulk material.

DETERMINATIVE BACTERIOLOGY. by Thomas H. Lord; Burgess Publishing Company, 426 South Sixth St., Minneapolis 15, Minn.; 1951, 63 pp., $2.25.

The Associate Professor of Bacteriology at Kansas State College of Agriculture and Applied Science presents a very practical spiral bound laboratory notebook which should make the study and the teaching of bacteriology even more absorbingly interesting. Twenty-four detachable diagnostic reports are bound into the back of the manual.

ECOLOGICAL ANIMAL GEOGRAPHY, by W. C. Allee and K. P. Schmidt; John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1951, 715 pp., 142 fig., $9.50.
QL101.H48 591.9 51-12300

In 1937 Drs. Allee and Schmidt secured permission to publish an authorized and annotated translation of Dr. Richard Hesse's "Tiergeographie und oekologischer Grundlage" of 1924. This book is a revision and modernization of the original 1937 translation. It is a happy coincidence that it comes close on the heels of that other well-known work by Alee, Emerson, O. and T. Park and Schmidt, "Principles of Animal Ecology," and thereby brings parallel works on two different fields. One very hopeful sign comes into ecological literature in this work—a greatly simplified terminology. There has been overmuch of terminology.

EDUCATORS' GUIDE TO FREE FILMS and EDUCATORS' GUIDE TO FREE SLIDEFILMS, by M. F. Horkheimer and J. W. Diffor; Educators' Progress Service, Randolph, Wis.; 1951, $6.00 and $3.00 each.

These two very practical volumes should be in every school library. The first is in its eleventh and the second in its third edition. The first lists 2,121 titles, of which 444 are new. The second lists 504 titles, of which 152 are new. Those who are in need of films or slides for classroom, laboratory, or meeting demonstration should have access to these works.

ELEMENTS OF PLANT PROTECTION, by Louis E. Pyenson; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1951; 538 pp., 226 fig., 50 tables, $4.96.

SB601.P9 632 Agr 51-548

Here is a new method of presentation for old scientific news. It is sturdily bound, printed on heavy paper, with the same kind of print-typewriter type to which the works of the many radioactivity texts from the atom bomb people have acquainted us. There are 28 chapters, of which half are devoted to the fundamentals of plant pests and diseases. The latter half of the work is devoted to the main problems of weed and insect control. There are a few chapters on the theory control of insects and equipment. The seventh to tenth chapters are devoted to stomach poisons, dormant and summer insecticides, the fumigants and sprays, and the new synthetic organic insecticides. The author's long experience with U.S.D.A. and in South America warrants more than passing attention to this work.

EMBRYOLOGY OF THE VIVIPAROUS INSECTS, by Harold R. Hagan; The Ronald Press, 15 East 26th St., New York 10, N. Y.; 1951, 472 pp., 160 fig., $6.50.

The biology library lacking this new work is going to have an indefensible gap in it. No other text, to the best of our knowledge, assembles all the facts on the embryology of viviparous insects and presents them in one complete coordinated whole. Whether used as a text or merely as a reference work, it will supply a lacuna on our library shelves. A casual reading is all that is necessary to see why this work was awarded the A. Cressy Morrison prize in natural science by the New York Academy of Sciences.

EVOLUTION, by A. Franklin Shull; The McGraw-Hill Book Company, 330 West 42nd St., New York 18, N. Y.; 1951, 322 pp., 142 fig., $5.00.

QH366.S56 575 51-11679

This is the first complete revision of the original work which appeared in 1936. Were it not for certain stable features of the original which have been retained, this revision is so therough that it might almost have just as well been published under a new title. The original work enlisted genetics into the evolutionary problem. Since 1936 genetics has undergone considerable development. Hence, this new application of genetic research to it.

FIELD GUIDE TO THE BUTTERFLIES, by Alexander B. Klots; Houghton Mifflin Company, 2 Park St., Boston, Mass,; 1951, 349 pp., 40 plates, 14 in color, $3.75.

QL548.K55 595.789 51-10190

Of handy pocket size, stoutly bound,

clearly printed, this addition to the Peterson Field Guide Series is apparently a worthwhile investment. Its opening chapters on the environmental relations of the butterflies, their life histories and growth, all precede the chapter on classification and the subsequent data thereon. Those preliminary chapters have some very good illustrations, particularly the environmental areas, and the colored photographs of some 28 larvae (caterpillars) and 28 pupae (chrysalids).

FLORE DU CONGO BELGE ET DU RUANDA-URUNDI (Spermatophytes), Vol. II; Ineac, 12 rue aux Laines, Bruxelles Belgium; 1951, 620 pp., 58 plates, 9 fig., ordinary paper 300 fr., bible paper 500 fr.

This is the second volume produced by the executive committee of the flora of the Belgian Congo and the State Botanical Garden, a publication of the National Institute for the Agronomic Study of the Belgian Congo (I.I.N.E.-A.C.). The committee includes L. Hauman, S. Balle, P. Staner and J. Leonard, G. Troupin, R. Boutique, G. Gilbert, W. Robyns, R. Wilczek, A. Taton, L. Toussaint and R. Germain. The volume covers the dicotyledons from the Chenopodiaceae to the Hamamelidaceae.

FOUNDATIONS OF BIOLOGY, by L. L. WOODRUFF and G. A. BAITSELL; The Macmillan Company, 602 Fifth Ave., New York 11, N. Y.; 1951, 719 pp., 517 fig. $5.50.

QH308.W6 574 51-11760

Dr. Woodruff's original 1922 "Foundations" is now in its seventh edition. This extensive revision of that justly popular text somewhat expands it and brings this latest edition thoroughly up to date. There has also been considerable rearrangement of the material to bring it more into line with the plans of the senior author before his death.

FUNCTIONAL MAMMALIAN ANATOMY, by W. T. TAYLOR and R. J. WEBER; D. Van Nostrand Company, Inc., 220 Fourth Ave., New York 3, N. Y.; 1951, 575 pp., illus., $7.25.

QL39.T35 611.072 51-11548

This new work by two new authors is built around the cat in an attempt to present a textbook which emphasizes anatomical rather than historical facts and all the other trappings and paraphernalia of traditional comparative anatomy. Clarity has been its aim, and the beginner's viewpoint has been kept constantly in mind. Facts have been stressed and the reasons for them have been freely accepted without distracting explanations.

GARDENS AND GARDENING, edited by F. A. MERCER and ROY HAY; the Studio Publications, 432 Fourth Ave., New York, N. Y.; 1951, 174 pp., 150 photos, $4.00.

SB403.G48 635.9058 32-26518

Amateur as well as professional horticulturists will appreciate this 1951 issue of "Gardens and Gardening." While last year's issue contented itself with the reduction in the size of gardens and necessary adjustment required thereby, this issue is devoted to bulbs for the whole garden season. The 150 photographs are gorgeous even in black and white.

GENERAL BOTANY LABORATORY BOOK, by E. M. PALMQUIST and L. C. PETRY; W. B. Saunders Company, 218 West Washington Square, Philadelphia 6, Pa.; 1951. $3.00.

This is the second edition of a manual which appeared in 1947 and met with an enthusiastic reception. The book is spirally wired to facilitate removal of completed exercises for handing in and correction.

GENERAL ZOOLOGY, by TRACY I. STORER; McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y.; 1951, 832 pp., $6.00.

QL47.S88 590 51-11680

Storer's well-known zoology text is growing. This second edition is a much heavier work than the first which appeared in 1943. In our previous review we commented on the compendiousness of the first edition, which, incidentally, ran through a number of reprintings. We still feel that this book is a mine of information for a two-semester course. It is much too heavy for a shorter run. This second edition has been changed and amplified in all the right places.

GENETICS, by A. M. Winchester; Houghton-Mifflin Company, 2500 Prairie Ave., Chicago 16, Ill.; 1951, 371 pp., 231 fig., $5.00.
QH431.W53 575.1 51-11153

Here is an entirely new textbook on genetics. Its format is pleasing, and almost all the illustrations as well as the diagrams are fresh. Each chapter ends with a selection of problems for the student. The author is a professor at John B. Stetson University, De Land, Florida.

GENETICS AND THE ORIGIN OF SPECIES, by Theodore Dobzhansky; Columbia University Press, 2960 Broadway, New York 27, N. Y.; 1951, 364 pp., 23 fig., 15 tables, $5.00.

This is the third revised edition of the author's original work which appeared in 1937 and which in its second edition ten years ago was awarded the Daniel Giraud Elliott Medal and Prize by the National Academy of Sciences. Compacted into this revision are all the important new developments in the story of evolution and the origin of species. No one can talk lucidly on either subject without a thorough understanding of Dr. Dobzhansky's book.

HUMAN ANATOMY AND PHYSIOLOGY, by N. D. Millard and B. G. King; W. B. Saunders Company, West Washington Square, Philadelphia 5, Pa.; 1951, 596 pp., 309 illus, 55 in color, 16 tables, $4.25.
QM23.M55 611 51-2535

This third edition embellishes a well-known and much-used text with many new illustrations as well as improved labeling of those used in its predecessors. Those who are interested in this book from the medical or instructional view point will find it a great improvement over its predecessors.

THE INFECTIOUS DISEASES OF DOMESTIC ANIMALS, by W. A. Hagan and D. W. Bruner; Comstock Publishing Company, Inc., 124 Roberts Place, Ithaca, N. Y.; 1951, 920 pp., 154 fig., 20 tables, $8.00.
SF781.H3 [619] 636.08969 51-4283

This second edition of the 1943 volume will be of use not only to those interested in pathogenic bacteriology and immunology, but also to all veterinarians and others who make public health and preventive medicine a life work. The book gives due importance to the animals as carriers of human infections and diseases. The bibliography is scattered under each pathogenic form studied. An alphabetical reference list would be a worthwhile addition.

INSECT NATURAL HISTORY, by A. D. Imms; The Blakiston Company, 1012 Walnut St., Philadelphia 5, Pa.; 1951, 317 pp., 40 color plates, 40 fig., 32 illus., $5.00.

A beginner's book in entomology, which started out as a layman's manual for nature lovers, this attractive textbook suppresses the use of unfamiliar terms and complicated anatomical details as far as possible. The author is honorary fellow of Downing College and was sometimes reader in entomology at Cambridge University. The insects figured are fairly cosmopolitan and the color work is so gorgeous it is worth the price of the work alone.

INSECT PHYSIOLOGY, by V. B. Wigglesworth, A Methuen Monograph; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1950, 134 pp., 12 fig., $1.25.
QL495.W53 595.7 51-3936

This handy little Methuen Monograph includes chapters on the insect integument, respiration, circulation, digestion, excretion, nutrition and metabolism, reproduction and growth, and the nervous system.

INSECTS IN YOUR LIFE, by C. H. Curran; Sheridan House, 257 Fourth Ave., New York 10, N. Y.; 1951, 316 pp., illus., $3.50.
SB931.C93 632.7 51-10474

This is a popularly written bit of science presented by no less an authority than the Curator of Insects and Spiders at the American Museum of Natural History. Many groups of common pest insects are described as well as some of the more common means of control. Dr. Curran is one of those rare scientists who can write clearly and colorfully about his subject for the general reader. Secondly, he has taken a portion of his vast subject and has shown how insects affect our lives and has described the extraordinary ways in which they live their own lives. Science fiction could not produce anything more fantastic than the processes of some common insects.

INTRODUCTION TO MODERN CHEMISTRY, by P. C. GAINES, L. O. BENDER and R. WOODRUFF; C. V. Mosby Company, 3207 Washington Blvd., Saint Louis 3, Mo.; 1951, 576 pp., 92 fig., $4.75.
QD33.635 540 51-5351

Here is a new text which comes from the chemistry staff of Montana State College. It is intended as a first year course in general chemistry, and offers just those subjects which the authors feel should belong in the first year. It is, therefore, short on history and all those interesting side lines which more properly should be studied in advanced work.

THE INVERTEBRATES, Volume III, by LIBBIE H. HYMAN; McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y.; 1951, 572 pp., 223 illus., $9.00.
QL362.H9 592 40-5368

This third volume in Dr. Hyman's famous series on the invertebrates carries on the chapters of the fist two volumes and treats of the pseudocoelomate bilateria as follows: Chapter XII, Phylum Acanthocephala; Chapter XIII, Phylum Aschelmenthes; and Chapter XIV, Phylum Entoprocta. Other volumes are promised which will carry on the series of the author's monumental reference works with their complete, detailed and modernized accounts of the anatomy, embryology, ecology and physiology of the invertebrates.

LABORATORY MANUAL FOR GENERAL ZOOLOGY, by TRACY I. STORER; McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y.; 1951, 150 pp., 20 fig., $2.50.
QL53.S78 590.72 51-13153

This is the second edition of the very practical manual which first appeared in 1944. It is designed to accompany the second edition of the author's "General Zoology." There is also available from the publishers a pamphlet, "Suggestions for Laboratory Instructors." Printed outline drawings for the students to complete and label are also procurable from the publishers, but should be ordered under the title "Plates to Accompany Laboratory Studies in Zoology," by Reed and Young, not by Dr. Storer.

LETTERS ON THE ORNITHOLOGY OF BUENOS AIRES, by W. H. HUDSON, Cornell University Press, 124 Roberts Place, Ithaca, N. Y.; 1951, 93 pp., $2.75.
QL689.A6H82 598.2982 51-10274

Although this is one of the smallest books to pass over any reviewer's desk this past year, it is not the least interesting by any criteria. The book is made up of the twelve unexpurgated letters from the Argentine and Patagonia which Hudson sent to Dr. P. L. Sclater, Secretary of the "Proceedings of the Zoological Society of London." Dr. Sclater saw fit to edit the originals before publishing them. Here they appear as they were written, spelling mistakes and all. Here also is the unvarnished record of one of the most scientific attacks ever made on Charles Darwin when that scientific pundit was at the height of his glory. To Darwin's credit it must be said that he did backwater, and was apparently more careful in his ornithological references thereafter. There is one brief but unforgettable incident in the first letter where he tells of the behavior of *Icterus pyrrhopterus*, the little bird sang in Hudson's hand after he had shot it. Other than ornithologists will also enjoy the freshness of this little book.

MAN AND THE ANIMAL WORLD, by BERNAL R. WEIMER; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1951, 569 pp., 296 fig., some in color, $5.00.
QL47.W46 590 51-11367

This is a new work by an author whose previous textbooks in collaboration with Dr. P. D. Strausbaugh and with E. L. Core have merited scientific attention and respect. In this solo performance the author has made good his intention to present a dynamic textbook with specific attention to the functional correlation between the student and his knowledge of the animal world.

MAN AND THE LIVING WORLD, by E. E. STANFORD; The Macmillan Company, 60 Fifth Ave., New York 11, N. Y.; 1951, 863 pp., 439 fig., $5.50.
QH308.S79 574 51-11757

The first edition of this work appeared in 1940. It was designed for a one-year course in which the integration of botany and zoology should be definitely anthropocentric. The popularity of the first edition has warranted its complete revision. The human body and its plant-animal relations, after all, should be the ultimate aim of any biology course which is terminal in a student's scientific experience.

MANUAL OF BACTERIAL PLANT PATHOGENS, by CHARLOTTE ELLIOTT; The Chronica Botanica Company, Waltham, Mass.; 1951, 186 pp., $6.00.
QR351.E4 589.95 51-13757

This is the second and entirely revised edition of a well-known manual covering the synonymy, the cultural, the morphological and physiological characters as well as the diseases produced, methods of control and bibliography of the plant pathogens.

MANUAL OF PHYCOLOGY, edited by GILBERT M. SMITH; The Chronica Botanica Company, Waltham, Mass.; 1951, 376 pp., $7.50.
QK567.S55 589.3 51-5732

The galaxy of phycologists who cooperated in producing this work is its own best recommendation. It covers the history of phycology, classification of algae, the chlorophyta, euglenophyta chrysophyta, pyrrophyta, phaeophyta, cyanophyta rhodophyta, fossil algae, cytology, sexuality, pigments, physiology and biochemistry, ecology of fresh water algae ecology of marine algae, the plankton, methods of cultivation and microtechnique. These have been contributed by: Drs. G. M. Smith, G. W. Prescott, T. L. Jahn, F. E. Fritsch, H. W. Graham, G. F. Papenfuss, F. Droult, K. M. Drew, J. H. Johnson, H. C. Bold, H. H. Strain, L. R. Blinks, L. H. Tiffany Jean Feldmann, B. H. Ketchum, E. G. Pringsheim and D. A. Johansen.

THE MEASUREMENT OF LINKAGE IN HEREDITY, by K. MATHER, A Methuen Monograph; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1951, 149 pp., 49 tables, $1.75.

This little Methuen Monograph is packed from cover to cover with mathematical formulae and tables for the statistical measurement of segregations, detection of linkages, their measurement and application to human genetics.

THE MECHANISMS OF CELL DIVISION, A Monograph, edited by M. J. KOPAC, Annals of the New York Academy of Sciences, Vol. 51, Art. 8, pp. 1279-1546; published by the Academy, 2 East 63rd St., New York 21, N. Y., 1951, 260 pp., illus., $3.50.

The contributor list to this monograph is its own best commentary: Edwin G. Conklin, Warren H. Lewis, Albert J. Dalton, Harold W. Chalkley, Robert Chambers, Douglas Marsland, Ethel B. Harvey, H. W. Beams, Michael Levine, G. H. Clowes, Jonas Friedewald, Ivor & Margaret Cornman, Ross Mac Cardle, Austin Brues and Leola Reitz, A. H. Sparrow, M. J. Kopac.

THE MOSSES OF WESTERN PENNSYLVANIA, by O. E. JENNINGS; University of Notre Dame Press, Notre Dame, Inc.; 1951, 396 pp., 72 plates.

This is a revision of the author's

earlier work which appeared some 38 years ago when he was just beginning his work as Editor of "The Biologist." The overcrowded too much reduced drawings give a sensation in ineffectiveness to the book which is otherwise quite acceptable.

ORIGIN, VARIATION, IMMUNITY AND BREEDING OF CULTIVATED PLANTS, by N. I. VAVILOV; The Chronica Botanica Company, Waltham, Mass.; 1951, 364 pp., 37 fig., $7.50.
QK1.C55 631.522 51-13692

This is K. Starr Chester's translation of selected writings of the Russian champion of classical genetics who died sometime in 1942 and who has been so bitterly opposed by T. D. Lysenko. Academician Vavilov's memoir is one of the great classics of biology (though it has never been translated before), and also of a timely interest in connection with recent controversial developments of genetics, plant and animal breeding in Russia. Before the author was liquidated, he published this account, a masterful presentation of scientific reasoning, free of political constraint, which remains the chief defense of orthodox genetics and breeding in Soviet Russia.

PALEONTOLOGY AND MODERN BIOLOGY, by D. M. S. WATSON; Yale University Press, New Haven, Conn.; 1951, 216 pp., 77 fig., $4.00.

This is the 1937 Silliman Memorial Lecture delivered at Yale University by the Jadrell Professor of Zoology and Comparative Anatomy of University College of the University of London. The aim of the work is to bring up to date knowledge of fossil discovery to the problems of evolution.

PARASITIC ANIMALS, by GEOFFREY LAPAGE; Cambridge University Press, 51 Madison Ave., New York 10, N. Y.; 1951, 351 pp., 113 fig., $4.00.
QL757.L34 591.69 51-13485

This work might well have been titled "Animal Parasitology," since it covers more the basic principles of parasitism than treating of the parasites in question topically. The author is Lecturer in Animal Pathology in the University of Cambridge.

PHASE MICROSCOPY, by A. H. BENNETT, H. JUPNIK, H. OSTERBERG and O. RICHARDS; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1951, 320 pp., illus., $7.50.
QH211.B45 578.1 51-13924

From the research laboratory of the American Optical Company in Stanford, Connecticut, comes this new work which will fill a needed place on the reference library shelves of many biology departments.

PHYSICAL BIOCHEMISTRY, by HENRY B. BULL; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1951, 355 pp., $5.75.
QD453.B84 541 51-12439

Dr. Bull is professor of Chemistry in the Northwestern University School of Medicine. He has a previous edition of this present work and a biochemistry of the lipids to his credit. This work, like its predecessor, is based on only those subjects or processes which are needed in solving medically important problems. He includes such new research methods as use of isotopes as tracer elements, light scatter and electrophoresis.

PHYSIOLOGY OF THE FUNGI, by V. G. LILLY & H. L. BARNETT; McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N.Y.; 1951, 464 pp., 81 fig., 64 tables, $7.50.
QK601.L5 589.2 51-12078

This is an entirely new work in a growing field of study and research. While it is presented as a textbook, complete with twelve laboratory exercises, the book will serve equally well as a reference, being well documented chapter by chapter with extensive bibliographies. The authors who acknowledge their indebtedness to the inspiration of Leon Leonian and E. A. Bessey in the dedication are, respectively, Professors of Physiology and Mycology at the West Virginia University.

PLANT EMBRYOLOGY (SPERMATOPHYTA), by Don A. Johansen; Chronica Botanica Company, Waltham, Mass.; 1951, 305 pp., 80 fig., regular $6.00, interleaved and leather-bound $14.00.

QK665.J6 581.3 51-9356

The embryogeny of the plant groups from the Cycadaceae up to the Anthophyta is here offered. Among the latter group the types and variations, spinal and comparative embryology, as well as apomictic embryogeny, adventitious embryology and polyembryony are all treated.

PRINCIPLES OF MODERN BIOLOGY, by Douglas Marsland; Henry Holy & Company, 257 Fourth Ave., New York 10, N. Y.; 1951, 757 pp., illus., $5.25.

QH308.M32 574 51-4432

In 1929 Dr. Charles R. Plunkett presented the scholastic world with a text called "Elements of Modern Biology." This reappeared in 1930 and 1934 under the same name. In 1945 it was reissued under Dr. Marsland's leadership. This is the edition, now appearing in revised form, which includes a new chapter, "Ecology and Evolution." There are many new illustrations, some old ones. There is a 15-page glossary.

PRINCIPLES OF WEED CONTROL, by G. Ahlgren, G. Klingman and D. Wolf; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1951, 368 pp., 109 fig., 25 tables, $5.50.

SB611.A35 632.58 Agr 51-123

The rapid growth and weed control processes and interest therein has long postulated a manual which would bring together between one set of covers as much of the current literature as possible. Rutger, North Carolina S. C. and the E. I. Du Pont de Nemours Company are the institutions represented in this joint work.

PRIVATE LIFE OF THE PROTOZOA, by Winifred Duncan; The Ronald Press Company, 15 East 26th St., New York 10, N. Y.; 1950, 141 pp. 14 plates, $3.00.

QL791.D85 591.5 50-10217

The author won his spurs in the field of science popularization with his "Webs in the Wind," a discussion of the habits of web-weaving spiders. This work is devoted to three groups: the protozoa in general, the metazoa (represented by the hydra, flatworms, rotifers and some crustaceans), and the insect larvae, naids and numphs.

RADIOACTIVITY APPLIED TO CHEMISTRY, by A. C. Wahl and N. A. Bonner; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1951, 604 pp., $7.50.

QD601.W24 541.38 51-5978

Planned to acquaint the user with the possibilities of applying radioactivity to various fields of chemistry and to furnish him with comprehensive summaries of work already done. Biologists who wish to get the background for their radioactive research will want to own this work, if only for its 1500-item bibliography which covers nearly forty pages.

SCIENCE RUSSIAN COURSE, by Maximilean Fourman; The Chemical Publishing Company, Inc., 26 Court St., Brooklyn 2, N. Y.; 1950, 274 pp., price not available.

PG2111.F 491.786 A51-2903

Technical workers who wish to read Russian scientific reports with a slender grammatical background will find this compact little volume not only practical but interesting as well. The reading matter is taken from science texts and extracts from the Bulletin of the Academy of Sciences of the U.S.S.R.

SOILS, by Gilbert W. Robinson; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1949, 573 pp., 22 figs., 9 plates.

S591.R645 631.4 50-58000 rev

This is the third edition of a textbook, previous editions of which appeared successively in 1932 and 1935. Its author is Professor of Agricultural Chemistry in the University College of North Wales. A widely travelled student, he is able to speak of most of the soils from personal experience. Particularly helpful are the outlines of the major soils of the great land masses as well as the treatment of soil chemistry.

STEVE MATHER OF THE INTERNATIONAL PARKS, by Robert Shankland; Alfred A. Knopf, Inc., 501 Madison Ave., New York 23, N. Y.; 1951, 348 pp., illus., $4.00.
SB482.A479 926.349 51-10310

This is a really thrilling life history of the millionaire owner of "20 Mule Team" who, after making his pile, dared to criticize the handling of the national parks to the Secretary of the Interior. The Secretary is said to have replied: "If you don't like the way the parks are run, come down to Washington and run them yourself." Mather called the Secretary's bluff, went to Washington and stayed there for fourteen years.

STUDY OF ANTIMETABOLITES, by D. W. Wooley; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1951, 269 pp., with fig. & tables, $5.00.

Entering a new field not ten years in existence took courage on the part of the author. He has had to contend with all the gaps and openings in our knowledge of those antagonistic substances which inhibit metabolism. The book has a 500-topic bibliography. The author is connected with the Rockefeller Institute.

SUCCULENT PLANTS OF NEW AND OLD WORLD DESERTS, by E. J. Alexander; New York Botanical Garden, Bronx Park, New York 58, N. Y.; 1950, 64 pp., illus., $.50.

This is a paper-bound booklet copiously illustrated dealing with the cacti and all their relations which inhabit the waste spaces of this and other countries.

TAXONOMY OF VASCULAR PLANTS, by George H. M. Lawrence; The Macmillan Company, 60 Fifth Ave., New York 17, N. Y.; 1951, 823 pp., 322 fig., $7.95.
QK93.L38 580.12 51-7352

The first part, 332 pages, is devoted to the principles and practices of plant taxonomy. The second part, 400 pages, treats of selected families of vascular plants. There are two appendices, one a suggested syllabus for an elementary course in taxonomy, the other is an illustrated glossary of botanical terms.

TEXTBOOK OF ORGANIC CHEMISTRY, by George Holmes Richter; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1948, 759 pp., 85 tables.
QD251.R48 547 43-9694

This is the kind of a reference work any biology laboratory shelf will find place for. Where else could one find scientific information on absinthe, adaline, allantain, amaranth, angelic acid, angostura alkaloids, asafoetida, aspirin,—just to mention the A's.

TRACE ELEMENTS IN PLANT PHYSIOLOGY, A Symposium; The Chronica Botanica Company, Waltham, Mass., and Stechert-Hafner, Inc., New York, N. Y.; 1950, 144 pp., 10 plates, $4.00.

TRACE ELEMENTS IN PLANTS AND ANIMALS, by Walter Stiles; Cambridge University Press, 51 Madison Ave., New York, N. Y.; 1951, 189 pp., 12 fig., $3.00.
QK867.S77 581.13 47-555

These two books arrived almost simultaneously on the reviewer's desk. The first is a report of the 1947 Rothamsted Experimental Station Symposium organized by the International Union of Biological Sciences under UNESCO. The second is a monographic contribution from the Harper Adams Agricultural College of the University of Birmingham. It is the older work in that this is the second printing of the original which was completed in 1944. Both overlap to some degree, but they complement each other so well that both should be in any good reference library.

ULTRAVIOLET SPECTRA OF AROMATIC COMPOUNDS, by R. A. Friedel and Milton Orchin; John Wiley & Sons, 440 Fourth Ave., New York

16, N. Y.; 1951, 579 spectra, 52 text-pages, $10.00.

Those who are interested in or use the spectra of many substances should be interested in this compendius N-Ethylpyrrole to Dinaphtho (abc), (jkl) coronene.

U. S. GOVERNMENT FILMS; United World Films, 1445 Park Ave., New York 29, N. Y.

A 79-page brochure of 16 mm. motion picture and 35 mm. filmstrips available for purchase at very reasonable rates.

VERTEBRATE SEXUAL CYCLES, by W. S. BULLOUGH, A Methuen Monograph; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1951, 117 pp., 12 fig.

This little Methuen Monograph purposes to present a brief up-to-date account of the sexual physiology of the vertebrates. Its five chapters are organized as follows: cycles of reproduction, hormones and their effect, sexual behavior.

THE VITAMIN B COMPLEX, by F. A. ROBINSON; John Wiley & Sons, Inc., 44 Fourth Ave., New York, N. Y.; 1951, $9.00.

A51-7662

Thirty-three pages of author indices and twenty-four devoted to subject matter index give some indication of the comprehensive size of this work. Its thirteen chapters treat of subjects such as: aneurine, riboflavine, naicin, adermin, pantothenic acid, biotin, folic acid, erythrotin, aminobenzoic acid, inositol, choline, and a final chapter devoted to miscellaneous water-soluble growth factors. Numerous techniques are described. The chapter on erythrotin (Vitamin B_{12}), for example, is subdivided into the following: isolation, purification and properties; estimation of the vitamin; occurrence of the vitamin; effect on animals and men; the vitamin and microorganisms.

Exchanges, Reprints and Separates Received

AGRI HORTIQUE GENETICA

Vol. III, Nos. 3 & 4:

Horberg, Y.—The dependence of baking capacity on viscosity and diastase power in wheaten flour.

Lamprecht, H.—Intra- and interspecific genes in Phaseolus and Pisum.

Nilsson, A.—The production of adventitious buds on roots and the employment of this property for the multiplication of perennials.

Vol. IV, Nos. 1 & 2:

Ameen, G.—Baking capacity and diastatic power in wheaten flour.

Berg, S. O.—Is the grittiness of wheat flour mainly a property of the variety?—Weibulls Virtus, a new variety of Winter wheat.

Horberg, Y.—Baking capacity and diastatic capacity of wheaten flour.

Lamprecht, H.—The linkage group Uni-M-Mp-F-St-B-Gl of Pisum.

Vol. IV, Nos. 3 & 4:

Berg, S. O.—Critique of some hitherto published south Scandinavian trials with late N-manuring to cereals for increasing the quality.

Lamprecht, H.—The practical importance of one-, two-, and three-flowered types for breeding work with peas.—Studies on the earliness of Pisum I. The conceptions earliners and duration of life.

LAKE STATES FOREST EXPERIMENT STATION:

Station Paper No. 25:

Changes in forest conditions, 1936-1949, North Central Minnesota and Upper Michigan, by R. N. Cunningham. (Significant changes have occurred in parts of the Lake States Region during the past 13 years. The overall comparison has fairly optimistic implications for conditions 25 to 50 years hence.)

Technical Notes:

No. 356: Christmas trees provide early returns from red pine plantations.

No. 357: Disking to increase stocking in Aspen stands.

No. 358: Is Jack Pine growth affected by age of parent seed?

No. 359: Chemical sprays reduce right-of-way maintenance cost.

No. 360: Why release young Maple from Pin Cherry?

No. 361: Construction of Lake States Deer Enclosure.

No. 362: Back Percent in Lake States trees.

No. 363: Successful Natural Jack Pine regeneration.

No. 364: Lake States Pulp Production Reverses Trend 1950.

No. 365: Effects of Soil and Topography on Oak Yields in Southern Michigan.

THE LIVING WILDERNESS:
Vol. 15, No. 35, Winter 1950-51:
Nature Sanctuaries in the United States and Canada, a preliminary survey, 46 pp.

MICRO-NOTES, DEVOTED TO MICROSCOPY:
Vol. V, No. 2, April-June 1950:
Jens Egede Nielsen Memorial Issue. Articles on collecting and identifying Diatoms, Slime Moulds, Straited Muscle Phase Photomicrography.

THE SEROLOGICAL MUSEUM:
Bulletin No. 6, May 1951:
Nuttall Memorial Issue.

TRANSACTIONS OF THE SAN DIEGO SOCIETY OF NATURAL HISTORY:
Volume XI:

No. 9: The Shovel-Nosed Snake, Chionatis, with descriptions of two new subspecies, by Laurence M. Klauber, pp. 141-204, pl. 9-10.

No. 10: The Kangaroo Rats, Diplodomys, of Baja California, by Laurence M. Huey, pp. 205-256.

No. 11: The Vagdes Collection of Trilobites, by B. F. Howell. pp. 257-328, pl. 1-3.

UNIVERSITY OF KANSAS MUSEUM:
Vol. III:

No. 2: Quantitative Study of the Nocturnal Migration of Birds, by George H. Lowery, Jr., pp. 361-372.

Vol. V:

No. 1: Preliminary Survey of a Paleocene Faunule from the Angels Peak Area, New Mexico, by Robert W. Wilson, pp. 1-11.

No. 2: Two New Moles, Genus Scalopus, from Mexico and Texas, by Rollin H. Baker, pp. 17-24.

No. 3: Two New Pocket Gophers from Wyoming and Colorado, by E. R. Hall and H. G. Montague, pp. 25-32.

Other Periodicals Received

"Annales de L'Arfas" of the French Canadian Association for the Advancement of Science.

"The Bent" of Tau Beta Pi.

"Bios" of Tri Beta Biological Society.

"The Bridge" of Eta Kappa Nu.

"The Cogwheel" of Alpha Pi Mu.

"The Colorado Comments" of the Colorado Game and Fish Commission.

"The Gamma Alpha Record."

"The Hexagon" of Alpha Chi Sigma.

"The Mendelian" of Spring Hill College.

"The Messenger" of Theta Kappa Psi.

"The Mortar Board Quarterly."

"The Scalpel" of Alpha Epsilon Delta.

"Sylva" of the Department of Lands and Forests of Ontario.

"The Wasmann Journal of Biology" of the University of San Francisco.

"Wisconsin Conservation Bulletin."

ENTRE NOUS

Personals

Our new President, *Dr. Harley J. Van Cleave* needs no introduction to any well-informed biologist in or outside of Phi Sigma. He has been a prolific writer of scientific reports and articles in many periodicals. He has been active in many biological organizations and has won the respect and confidence of their memberships to such an extent that he has held office in many of them. His connection with Phi Sigma dates back to 1925 when, as Associate Professor of Zoology, he was elected to membership in Rho Chapter at the University of Illinois. A native son of the Prairie State, most of his life's work has been carried on in his home state. He has broadened his experiences in many areas, however, by summer teaching, lecturing or research at the Puget Sound Marine Station, at the U. S. Bureau of Fisheries, at the Roosevelt Wild Life Experiment Station, Syracuse; at Cold Spring Harbor; at the Isles of Shoals Marine Zoological Laboratory. He has been Section Editor and member of the Advisory Board of "Biological Abstracts," on the Editorial Committee of the "Illinois Biological Monographs," on the Editorial Staff of the "American Midland Naturalist," and on the Editorial Board of the "Journal" of the Society of Parasitologists. He has been active in the American Society of Zoologists, the Ecological Society of America, the Microscopical Society, the Society of Limnology and Oceanography, and the Fisheries Society. He has been both President and Vice President of the Illinois Academy of Science. His main field of research has been divided over parasitology and the acanthocephala. His first contribution to "The Biologist" appears in this issue.

At the meeting of the Council of Phi Sigma Society which was held during the month of October in Denver, the members of the Council voted to present Erwine Hall Stewart, Council Vice-Chancellor with the jeweled key of the organization for his many long years of service as Treasurer of Phi Sigma. Mr. Stewart was elected Vice-Chancellor of the Council at the Denver-Boulder Convention of Phi Sigma a year ago. The continued existence of our Biological Honor Society has been, to a large extent, due to the prudence and business acumen of Mr. Stewart. There were times in the depression years when only his generosity kept the Society solvent until it was able to get back on its feet again. Without him it would have foundered and probably would never have been able to reorganize itself.

Succeeding Mr. Stewart in the Treasureship of Phi Sigma is *Professor Tema Shults Clare* of the University of Southern California, Los Angeles. A native of Missouri, Mrs. Clare took her bachelor's degree at Southern California in 1930 and her master's degree in 1931. She was a Teaching Assistant in Botany and Biology and became Assistant Professor of Botany in 1945. She has been particularly interested in seed germination, polyembryony, and the anatomy of the curcurbits. Mrs. Clare entered Phi Sigma by way of Alpha Alpha Chapter in 1930.

Too late for the Spring issue which had already gone to press when the announcement was made, it is still appropriate for "The Biologist" to announce the election of two members of Phi Sigma to the National Academy of Science which took place in Washington, D. C., last April 24. Among the members so honored was *Dr. Roy E. Clausen*, Chairman of the Division of

Genetics at the University of California. He was initiated into Mu Chapter in 1923.

In the same election another well-known member of Phi Sigma, *Dr. A. F. Riker*, received a similar honor. He is Professor of Plant Pathology at the University of Wisconsin and entered Phi Sigma through Zeta Chapter in 1921.

On 15 January 1952 the new officers elected at the Philadelphia meetings of the American Association for the Advancement of Science assumed their responsibilities. Among Phi Sigma members who assumed these responsibilities, we note with pleasure the election of *Dr. Lincoln Constance* of Stanford University as Vice-President and Chairman of the Section (G) on Botanical Sciences. Dr. Constance was elected to Phi Sigma in 1931 by Mu Chapter.

As Vice-President and Chairman of the Section (H) on Anthropology, *Dr. F. H. H. Roberts, Jr.* of the Smithsonian Institution assumes office. Dr. Roberts was elected to membership in Epsilon Chapter at the University of Denver in 1923 while he was Instructor in Archeology. Since then he has held positions as Assistant in Anthropology at Harvard, Archeologist in the Bureau of American Ethnology at the Smithsonian Institution, over which he became Associate Director in 1948.

Elected to membership in the Executive Committee was one of the early members of Phi Sigma, *Dr. Paul B. Sears*, Overland College. Dr. Sears became a member of Phi Sigma in 1916 in Alpha Chapter at Ohio State University the year after the honor society was organized.

A member of Omega Chapter was also elected to the Executive Committee of the AAAS, *Dean Laurence H. Snyder* of the Graduate College and Professor of Medical Genetics in the College of Medicine of the University of Oklahoma. He served this past year as Visiting Phi Sigma Lecturer to many of our chapters. His story of his experiences appears in this issue of "The Biologist."

Among the members of the Governing Board of the American Institute of Biological Sciences, a branch of the National Research Council, we note the names of *Dr. H. Burr Steinbach*, Professor of Zoology at the University of Minnesota. Dr. Steinbach was elected to Phi Sigma by Beta Chapter in 1927, the year before he took his bachelor's degree at the University of Michigan.

Another early member of Phi Sigma appears on the Governing Board of AIBS in the person of *Dr. J. C. Walker*, Professor of Plant Pathology at the University of Wisconsin. Dr. Walker was a member of the old Lapham Biological Society which at the time of his membership was incorporated into Phi Sigma as Zeta Chapter.

A comparatively new organization in the biological field is the American Society of Professional Biologists. Among its Vice-Presidents we note the name of *Dr. Martin D. Young*. Dr. Young was elected to Phi Sigma by Pi Chapter while he was still a graduate student at Emory University in 1929. Since then he earned his doctorate at Johns Hopkins School of Hygiene. Following this he affiliated with the United States Public Health Service, where he functions chiefly in the field of malarial parasitology. He is President of the South Carolina Academy of Science and holds the Vice-Presidency of the southern district of the ASPB.

Dr. Maurice L. Moore, who has held offices in the American Chemical Society and who has been active in pharmaceutical matters in general, was recently elected Vice-President of the well-known Vick Chemical Company with headquarters in New York. Dr. Moore is a member of Sigma Chapter of Phi Sigma to which he was elected in 1929.

As National Secretary of Alpha Epsilon Delta, the national premedical honor society, Dr. Moore keeps us in touch with activities of his organization. Last March Alpha Epsilon Delta celebrated the Silver Jubilee of its foundation and the conclusion of twenty-five years of service to premedical students and the advancement of premedical education. Prior to his association with the Vick Chemical Company, Dr. Moore's address was: 37 White Marsh Road, Ardmore, Pennsylvania.

Bowling Green State University announced on October 15 the appointment of *Dr. Karl W. Halberg* of Muskegon, Michigan, as Assistant Professor of Biology. He received his bachelor's, master's and doctor's degrees at the University of Michigan, where he became a member of Beta Chapter of Phi Sigma.

Rotary International announced the reception of its international fellowship by two members of Phi Sigma. One, *Miss Clara M. Quinnell* of Butte, Montana, became a member of Chi Chapter of Phi Sigma before receiving her degree from Montana State College in 1950. She later took her master's degree in bacteriology at the University of Wisconsin and will use her fellowship to study bacteriology at the University of Manchester in England.

Robert L. Love of Melrose, New Mexico, was the other member of Phi Sigma to be included among the ninety outstanding graduate students of thirty-three counties who receive the Rotary Foundation awards. Bob was active in Alpha Nu Chapter of Phi Sigma prior to receiving his Bachelor of Science Degree from the University of New Mexico in 1950.

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In the Editor's Mail

From time to time the Editor of "The Biologist" receives letters which are a distinct lift to his spirits and no little encouragement to the members of the Council of Phi Sigma. It is a pleasure to include in our this issue's mailbag those which have been received from former members of our organization, as well as those who have found our work of service.

Waukegan Twp. High School
Waukegan, Illinois
August 31, 1950

Dear Sir:

We would appreciate being able to secure a recopy of "Employment for Biologists" by Dr. Donald J. Zinn, of the Department of Zoology at Rhode Island State College, published in the *Biologist 31* (4): 105-113, May, 1949. We would like to secure a copy to submit to our student Councilors.

Yours truly,
Wilma Bartimus
Biology Instructor

UNIVERSITY OF KANSAS
MUSEUM OF NATURAL HISTORY
Lawrence, Kansas
January 15, 1951

Dear Dr. Keefe:

Someone placed the September and November numbers of "The Biologist" in my mail. It has been a long time since I have read "The Biologist" regularly. This note is merely to congratulate you upon the attractive appearance and significant content of the magazine. I was especially pleased with the space given to the proposal to introduce axis deer on the island of Hawaii. Even though the deer are on Molokai it certainly would be unwise to put them on Hawaii. Editorials and space given to important matters of such current interest make for better magazines and I should think that some of the other pressing biological problems that call for action one way or the other might be taken up in later numbers of the magazine.

Cordially,
E. R. Hall

UNIVERSITY OF ARIZONA
TUCSON
College of Liberal Arts
Department of Zoology
February 3, 1951

Dear Dr. Keefe:

Your letter of 18 January 1951 and the several copies of *The Biologist* have been received. You have indeed been most generous and I do sincerely appreciate your sending on so many copies especially since reprints apparently have not been prepared.

As I stated to you in my first letter, I am indeed most happy to have the opportunity to voice my feelings in this matter of the giant African snail before a still different audience. I am actually indebted to you for permitting me to get the subject in a scientific publication. With a number of people in Washington busily cooking up legislation to meet the threat presented by this world's largest land snail pest, it does seem that all this advertising has been successful.

Once again I thank you for your interest in my problem and your willingness to reprint my article in *The Biologist*. If you ever travel in the Southwest, I do hope you will plan to visit me here in Tucson. Best of good luck to you in your work.

Very sincerely,
Albert R. Mead
Assistant Professor
of Zoology

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Cambridge 39, Mass.
Department of Biology
March 5, 1951

Dear Dr. Keefe:

Thank you for your letter of February 14 regarding progress in the Phi Sigma Society and its official organ *The Biologist*.

The bundle of recent issues has also arrived and I am looking forward to looking at them. It will bring back old times. If I have any constructive ideas I shall be glad to send them on to you.

With all good wishes,

Sincerely yours,
Francis O. Schmitt

BROOKLYN BOTANIC GARDEN
1000 Washington Avenue
Brooklyn 25, New York
George S. Avery, Jr.
Director
March 9, 1951

Dear A. M. K.—

Best thanks for your letter of mid February and for the several copies of *The Biologist*. It is perfectly clear that you are making real progress with the journal. It is a pity that you have to get so much within the two covers that it is necessary to use the small type.

The "New Books" section is particularly well done and there seems to be a sufficient scattering of article interest to help guide students trying to find their way in the field of biology.

With kindest personal regards.

Sincerely,
George Avery

RUTGERS UNIVERSITY
The State University of New Jersey
College of Arts and Sciences
Dept. of Zoology, New Brunswick, N. J.
March 22, 1951

Dear Mr. Keefe:

My long delay in answering your good letter of February 14 is no real measure of my interest. I deeply appreciate the copies of *The Biologist* which I found most interesting. It is evident that there is a real place for a journal such as this, and that we who teach these young students should be more active in encouraging them to write.

Dr. Carriker, also a member of the Wisconsin chapter and Assistant Professor here, has been very successful in getting our undergraduate students to speak and even to hold simple symposia. I am passing your letter on to him with the suggestion that he try to get some of the better of these students to put in writing what they have presented by word of mouth. Some of these efforts you might consider worthy of publication.

Will you put me down for a subscription to *The Biologist* and send me a bill?

With sincere thanks and best wishes for continued success, I am,

Cordially yours,
Thurlow C. Nelson,
Professor of Zoology
Chairman, Water Policy
and Supply Council
Department of Conservation and Economic
Development

SMITHSONIAN INSTITUTION
BUREAU OF AMERICAN ETHNOLOGY
Washington 25, D. C.
May 9, 1951

Dear Dr. Keefe:

I am very much afriad that I must be placed in the category of the present day students to whom you refer in the last paragraph of your letter in that it has taken me a long time to get a reply off to you. Please do not think that my delay is due to lack of interest. The last two months have been especially busy ones here at the office and I have not found it possible to keep up with my correspondence in the way I should like.

I do not know who is responsible, but I presume Erwine Stewart is the man to thank for copies of *The Biologist* which are sent to me from time to time. I had received most of the numbers from the volumes which you sent me but there were one or two which I had not seen.

I have been interested in some of the changes which have been made since you sent out your questionnaire to various of the alumni members. On the whole, I think that the journal is satisfactory and that you have done a good job in prying manuscripts out of what appear to be reluctant or perhaps I should say procrastinating authors. Most of the articles you have printed in recent numbers seem to me to be of better quality than you were getting for a time. I do not know to whom the credit should go for that—perhaps to you, although it is possible that the colleges have been stimulating people to a somewhat greater effort along that line.

I have been curious as to what reaction, if any, you may have had to the article on "Hints for Science Writing" which appeared in the November 1950 issue. I knew old Dr. Slosson and am well acquainted with Watson Davis. Davis certainly is in a position to tell what is desired in science writing and to suggest ways of bettering a manuscript. If those writing articles for publication follow the advice given in the three articles included in the "Hints for Science Writing," I am sure the results will be noticeable.

I wish I knew how to advise you as to the best means for prying articles out of students and even professors, but I must confess that I am stumped with a similar problem. We have a group of young archeologists scattered over the country working on the project of trying to salvage as much as possible from sites which will be flooded by the construction of flood control, hydro-electric, and irrigation dams, and while all of them are doing very good work in the field, I find it extremely dicffiult to get the desired reports on the results of their efforts. It isn't a case of lack of material because they have plenty to write about. It seems to be largely a matter of getting them down to a desk and keeping them there until they have produced.

Under existing conditions, it probably is more difficult than ever to stimulate students to the point of preparing articles for publication. It would seem to me, however, that if their professors would make an effort to emphasize the value of getting things in print, even though they may not be on a subject which is entirely new and startling, it might help. Not being in close contact with students, I may be over-optimistic on that score. As I recall my own student days, however, I remember that there always were a number of students who were delighted at the prospects of seeing something which they had written appear in print.

I do not know if any of the above will be of help or not. I do think, however, that taken as a whole there has been considerable improvement in *The Biologist* and I trust that you will be able to continue showing progress.

With best regards, I am

Sincerely yours,
Frank H. H. Roberts, Jr.
Director,
River Basin Surveys

Berkeley: College of Agriculture
Division of Plant Pathology
University of California
May 9, 1951

My dear Dr. Keefe:

Thank you for your letter of February 12 and the copies of "The Biologist." By including more research and discussion papers and making reprints available you have made this a more important journal. You deserve great credit for this and for doing a good editorial job.

The university libraries should be encouraged to bind "The Biologist" and maintain it among their journal sets. This will make it a permanent repository of research, as Dr. Keitt used to tell us.

I enclose a five-year subscription.

Sincerely yours,
M. W. Gardner

Why Do Our Students Lack Writing Ability?

The complaint that many graduates of our schools and colleges write their native language badly is chronic and widespread. Secondary schools are unhappy about it, colleges make a Custer's Last Stand known as Freshman Composition; but in the long run Business, employer of most of our graduates, feels obliged to set up its own courses and recently has been going the way of all Flesch. "Patently," says *Fortune* (November, 1950), "something is very wrong with the teaching of English when graduates so fail to grasp the fundamentals of good English that they feel they must learn a separate kind for everyday life—and a rather bobtailed one at that."

Of course there is something wrong. Indeed, there are so many things wrong—including the size of English classes—that it woul take all of this space to enumerate the multiple causes of what everybody deplores. Let me state, in oversimplified form, two related causes and one type of cure.

1. Writing is like any other skill; the way to learn to do it better is by doing it, subject to the judgment of our peers and superiors. Do we give students enough such practice, even in English courses? Direct instruction about the English language is no substitute for experience in using it. Beyond a certain point, indeed, isolated instruction bores, is resented, and paralyzes the will to write.

2. Besides being a skill, writing is also a form of behavior. In behavior we normally respond to the requirements of a community whose opinion respect, cherish, or fear. If we want language-conduct to develop along with other aspects of personality and mind, the whole school as a community must make roughly equal demands. Specifically, if we want acceptable writing to become habitual behavior, teachers who are not English teachers must care about it. Otherwise, "English" becomes in his mind an abnormal phenomenon.

In order to repair these pedagogical lacunae, we have developed at Colgate University a series of organized writing experiences in non-English courses, as a function of the day-by-day learning process.—Professor Strang Lawson, Colgate University, in *The English Record* (N.Y.).

Today's College President

Few positions place more responsibility upon a man than the present-day presidency of an independent college. To as great a degree as possible he must exemplify the best attributes of the educator, the administrator, the expert in public relations, and the financial wizard. He must win the respect and co-operation of young men and young women striving to achieve the independence of maturity while plagued by the insecurities of adolescence. He must win the allegiance and become the acknowledged leader of a highly trained group of scholars and teachers and accept responsibility for the quality of their work, for in it resides the strength of the college. He must interpret the aims and needs of the college to the trustees and maintain their enthusiastic support.—Dean Richards in *At Denison*.

CHAPTER OFFICERS AND NEWS

BETA
—University of Michigan
Ann Arbor Michigan

President—James A. Peters, Museum of Zoology, Univ. of Mich., Ann Arbor, Michigan.

Vice-Pres.—John A. Schmitt, Jr., Dept. of Botany, Univ. of Mich., Ann Arbor, Michigan.

Corr. Sec.—Malcolm N. Macintyre, Dept. of Zool., Univ. of Mich., Ann Arbor, Michigan.

Rec. Sec.—Stanley K. Gangwere, Dept. of Zool., Univ. of Mich., Ann Arbor, Michigan.

Treasurer—George W. Byers, Museum of Zoology, Univ. of Mich., Ann Arbor, Michigan.

Editor—Theodore P. Bank, Jr., Museums Annex, University of Mich., Ann Arbor, Michigan.

Council Rep.—Dr. Karl F. Lagler, Dept. of Nat. Resources, University of Michigan.

EPSILON
—University of Denver
Denver, Colorado

President—David Breternitz, 2041 So. Vine, Denver 10, Colorado.

Vice-Pres.—Nicholas Keller, Rt. No. 1, Box 440, Arvada, Colorado.

Corr. Sec. & Rec. Sec.—Gwen A. Schultz, 1115 Logan, Apt. 110, Denver 3, Colorado.

Treasurer—John Ness, 1801 Bellaire, Denver, Colorado.

Editor & Council Rep.—Dr. Frederick Zeiner, 1417 So. Elizabeth, Denver, Colorado.

We regret our inability to forward any information at this time.

Only four members are back from last years group and coupled with an insufficient number of candidates we were forced to go inactive during the fall quarter; however, we plan to begin regular meetings and initiate a new group of members during January.

Our list of chapter officers has been sent in. Aside from this we have nothing to report, as of the present time.

David A. Breternitz
Pres., Epsilon Chapter

ZETA
—University of Wisconsin
Madison Wisconsin

President—Derald A. Alack, Dept. of Plant Pathology, Univ. of Wis., Madison 6, Wis.

Vice-Pres.—Sherman Watson, Dept. of Medical Physiology, Madison, Wisconsin.

Corr. Sec.—George W. Keitt, Jr., Plant Physiology, Madison, Wisconsin.

Rec. Sec.—Rose Rozich, Dept. of Zoology, Univ. of Wis., Madison 6, Wis.

Treasurer—Billy L. Sims, Dept. of Horticulture, Univ. of Wis., Madison 6, Wis.

Editor—David E. Kay, Dept. of Agronomy, Univ. of Wis., Madison 6. Wis.

Council Rep.—O. N. Allen, Agr. Bacteriology.

ETA
—University of Akron
Akron, Ohio

President—Patricia Waldron, Dept. Biology, University of Akron, Akron, Ohio.

Vice-Pres.—Barbara Price, Dept of Biology, University of Akron, Akron, Ohio.

Corr. Sec. & Rec. Sec.—Lois Hunsicker, Dept. of Biology, University of Akron, Akron, Ohio.

Treasurer—Richard A. Pamplin, Dept. of Biol., University of Akron, Akron, Ohio.

Editor—

Council Rep.—Dr. W. C. Kraatz, Dept. of Biology.

KAPPA
—University of Kansas
Lawrence, Kansas

President—Ivan J. Shields, Dept. Botany, Univ. Kansas, Lawrence, Kansas.

Vice-Pres.—Jerome Grunt, Dept. Anatomy, Univ. Kansas, Lawrence, Kansas.

Corr-Sec.—Don Ford, Dept of Anatomy, Univ. Kansas, Lawrence, Kansas.

Rec. Sec.—Keith Wolfenbarger, Dept. of Ent., Univ. Kansas, Lawrence, Kansas.

Treasurer—Margaret Brewster, Dept. of Botany, Univ. Kansas, Lawrence, Kansas.

Editor—Wendell Showalter, Dept. of Bot., Univ. Kansas, Lawrence, Kansas.

Council Rep.—Mrs. Ruth K. McNair, Dept. of Biology

Kappa Chapter meets every other Tuesday noon in Snow Hall with the members bringing their own lunches and with coffee being furnished by the chapter.

The fall semester has been filled with interesting programs which also included some evening meetings. Dr. M. L. Furcolow, Sr. Surg. USPH., spoke on, "Histoplasmosis", describing some of the research in regard to that problem. Dr. Alex Sweet, Asst. Prof. of Psychology, discussed, "The Effects of Glutamic Acid Ingested by Pregnant Rats on the Maze Learning Ability of Their Offspring". Dr. John Weir, Asst. Prof. of Zoology, talked on, "Geneticists: Are They Human?". Dr. Robert Beer, Asst. Prof. of Entomology, presented a talk entitled, "Of Mites and Men".

An entire meeting was devoted to the election of new members following the presentation of a list of prospective new members by the membership committee. The formal initiation ceremonies were held in Snow Hall the evening of Dec. 17, with twenty-six new members being accepted into the chapter. Dr. J. H. Nelson, Dean of the University Graduate School, was the speaker for the occasion. He discussed, "Your Graduate School and Research".

Those initiated into Kappa Chapter at this time included Dr. David Paretsky, Asst. Prof. in Bacteriology, and Mrs. Magdalene Carttar of the Dept. of Physiology as faculty members, and the following as active members: Leland E. Keller and McCormick Templeton from the Dept. of Anatomy; Vernon D. Foltz, Keith R. Long, Joan McCamish, and Stanley L. Silberg from the Dept. of Bacteriology; Russel C. Keeler, John N. Perdew, John R. Reany, George E. Reed, and Eugene B. Wittlake from the Dept. of Botany; DeRyee A. Crossley, Jr., Clarence C. Hall, Jr., Wallace E. LaBerge, Roger D. Price, and Paul J. Spangler from the Dept. of Entomology; Elliot S. Valenstein from the Dept. of Psychology; Joseph D. Breazeal, Frank Dolyak, Kenneth L. Fitch, Charles W. Hall, John L. Hawken, Thane Robinson, and Robert J. Russell, Jr. from the Dept. of Zoology.

Wendell V. Showalter
Editor, Kappa Chapter

LAMBDA
—Montana State University
Missoula, Montana

President—Robert Murray, Corbin Hall, Missoula, Montana.

Vice-Pres.—Charles Waterman, Corbin Hall, Missoula, Montana.

Corr. Sec.—Ruth Scott, 601 Daly, Missoula, Montana.

Rec. Sec. Treasurer—Lyle Shoemaker, 540 McLeod, Missoula, Montana.

Editor—Dale Benson, 3rd and Curtis St., Missoula, Montana.

Council Rep.—Dr. L. G. Browman, Zoology Dept., M.S.U.

Recently Lambda Chapter of Phi Sigma, founded here in 1921 through the efforts of Dr. M. J. Elrod, now Professor Emeritus of Biology, celebrated its thirtieth anniversary at Montana State University. At that time Dr. Laurence H. Snyder, Dean of the Graduate College at the University of Oklahoma and one of the nation's leading geneticists, told a large enthusiastic audience that, "Today genetics stands shoulder to shoulder with the older sciences and hopes to contribute its share to the health and happiness of mankind." Dr. Snyder discussed the application of family medical history to prevent reappearance of genetic diseases and the application of genetic knowledge to medical and legal problems like crime detection and childbirth. It was largely through the efforts of Dr. Snyder that the modern statistical methods for study of human inheritance were developed. Moreover, he organized and presented the first course in medical genetics to be required in any United States medical school.

This Chapter has been fortunate in having several other interesting speakers within the last few months. At one meeting Dr. Royal B. Brunson, Assistant Professor in Zoology at Montana State University, presented colored films taken during the summer at the Montana State Biological Station on the east shore of Flathead Lake. The films showed some of the many activities which the summer students there experienced.

Dr. Meyer Chessin, Instructor in Botany who is doing research on plant viruses, presented the Lambda Chapter with details of his progress to the present time.

At the formal initiation banquet held in the Student Union just after Thanksgiving, Dr. Wesley P. Clark, Dean of the Graduate School and Chairman of the Department of Classical Languages, gave an inspiring talk on the common areas of interest between the scientists and the humanist. Initiated were: Robert Nogler, Robert Lake, Sumner A. Dow, and Frederick Gerlach.

In the near future Mr. Edmund E. Jeffers, Assistant Professor of Bacteriology and Hygiene, plans to discuss fish pathology.

Dale B. Benson, Editor

NU

—Washington and Jefferson College, Washington, Pennsylvania

President—William S. Morrison, RD No. 6, Washington, Pa.

Vice-Pres.—Clyde L. Holmburg, 115 East Maiden St., Washington, Pa.

Sec.-Treas.— Chauncy Headly, 12 McClane Ave., Washington, Pa.

Corr.Sec.—Forrest G. Tompkins, 333 East Beau St., Washington, Pa.

Coun. Rep.— Dr. C. D. Dieter, Biology Dept., Wash. & Jeff. College.

On May 8, 1951 the above officers were installed to lead Nu Chapter of Phi Sigma for the academic year 1951-1952.

The meetings this year are being held twice a month. Members of the chapter have participated by presenting lectures which are followed by brief discussions. Below are the students and their respective topics.

Clyde Holmburg — Microtechnique in Biol.

Alexander Rein—Nervous and Chem. Factors in Regulation of Respiration.

Charles Launday—Steroid Chemistry.

However, the outstanding event of this year was the initiation of these new members: William Cohen, Jerome Lurie, Wallace Miller, Bernard Kramer, Daniel Kimberg, Philip Williams Jr., Raymond Cornell, Edward Frohlich, Joseph Inglefield, Paul Kiell, Stanley Renner, Henry Seidel, Norman Posner, William Inglis, Melvin Sher, Robert Lynch, John Parker, Henry Wechsler, Robert Gvozden and Paul Dugan.

After the formal initiation all members attended a banquet. The evening's festivities were punctuated with an address given by Dr. Ralph Buchsbaum, who is presently associated with the Biology Dept. of the University of Pittsburgh. Dr. Buchsbaum received his PhD. from the University of Chicago in 1937. While at the University of Chicago his interest in Biology centered around research in Radio Biology and Biophysics. His current field of research is *The effect of Radioactivity on Living Cells.* This latter subject formed the nucleus of his talk. An outstanding feature of his presentation was the effective use of movies to demonstrate the changes in cells under radiation.

Since our membership has been enlarged we have decided to begin the year 1952 with more student participation. It is our plan to conduct a seminar which will include four phases of Biology; Embryology, Physiology, Anatomy and Genetics. The idea being that each group will be prepared to discuss their phase of the seminar as directed by the student leader. Our first series includes *Recent Advances in Cell Research.* The material for this is to be obtained from the Biological Journals in our Library.

Forrest G. Tompkins
Corr. Secr., Nu Chapter

PI
—Emory University
Georgia

Pres.—Harold Steel, Dept. Biology, Emory University, Georgia.
Vice-Pres.—William J. Rawls, P. O. Box 455, Emory University, Georgia.
Corr. Sec.—Miriam Runyon, 144 Garland Ave., Decatur, Georgia.
Rec. Sec.—Walter A. Rees, Box 46, Emory University, Georgia.
Treas.—Fred P. Amsler, 335 Winnona Drive, Decatur, Georgia.
Editor—Mrs. Helene Lammers, 125 Wilton Drive, Decatur, Georgia.
Dr. W. B. Baker, Dept. Biology, Emory University, Georgia.

Alumni News From The Pi Chapter "Bulletin"

Herbert L. Ratcliffe ('25-'26G)
D.Sc. from Johns Hopkins. Now with Pathology Dept. U. of Penn. 2 Cedar Lane, Merion Station, Pa.
Clinton Baker ('25-'26G)
Ph.D. from Columbia U. Now Prof. of Biology, Southwestern U., Memphis, Tenn.
H. P. Sturdivant, Jr. ('23-'26G)
Ph.D. from Columbia U. Now at Western Maryland College, Westminister, Md.
Ruth Pirkle Berkeley ('26G)
M.D. from Cornell Med. School. Now psychiatrist in New York City. 36 W. Eleventh St., New York 11, N. Y.
John Marshall Ellis ('24-'26G)
Ph.D. from U. of Cal. Now with Natl. Health Inst., U. S. Pub. Health Service, Bethesda 14, Md.

Lucille Caldwell ('28G)
Ph.D. and M.D. from Johns Hopkins. Now practicing medicine. 11 E. Chase St., Baltimore 2, Md.

B. A. Belcher ('28-'29G)
Now doing research with U. S. Dept. of Agriculture. Box 421, Canal point, Fla.

Lucille Coleman Christian ('30-'31G)
15 Hawthorne Ave., Princeton, N. J.

Gene Stead ('28-'32M)
Formerly Dean Emory Med. School. Now Prof. of Medicine, Duke Med. School. 2122 Myrtle Dr., Durham, N. C.

Peggy Brown ('28G)
(Mrs. Jose F. Nonidez)
3741 Mt. Park Dr., Birmingham, Ala.
T. F. Sellers ('32M)
Now Director of Ga. Dept. of Public Health, State Capitol, Atlanta, Ga.
John Venable ('29-'33M)
Now Health Office. 44 Terrace Ct., Griffin, Ga.

Helene Norwood Lammers
Now teacher of biology in Atlanta Public Schools. Elected President of Atlanta Science Club '51-'52.

Martin Young ('31-'32G)
Ph.D. from Johns Hopkins. Now with U. S. Public Health Service, P. O. Box 717, Columbia, South Carolina.

Hortense Elton Garver ('30G)
Now Hematologist with Lawson Hospital. 1302 Emory Rd., N.E., Atlanta.

Trawick Stubbs ('31-'32G-'40M)
Now Dean of U. of Missouri Med. School, Columbia, Missouri.

J. E. McCroan, Jr. ('31-'32G)
Ph.D. U. of Iowa. Now Asst. Dir. of Division of Epidemiology, Ga. Dept. of Public Health. 1468 Clairmont Rd., Decatur, Ga.

Annie Sue Anderson Brown ('32G)
(Mrs. M. Gordon Brown)
Now Science Coordinator, Atlanta Public Schools.

Nelson T. Spratt ('35)
Ph.D. from U. of Rochester. Now Professor at U. of Minnesota, Minneapolis.

Marion Brooke ('35-'36G)
Doctor's degree from Johns Hopkins. Now with Laboratory Section, Communicable Disease Center, U. S. Public Health Service, Lawson Hospital.

Burness E. Moore ('33)
Won Beck Scholarship. M.D. from Harvard. Now psychiatrist in New York. 1148 Fifth Avenue, New York 8, N.Y.

Norman Giles ('37)
Won Beck Scholarship. Ph.D. from Harvard. Now with Botany Dept., Yale U. 33 Franklin Road, Hamden 14, Conn.

Don Eyles ('38-'39G)
D.Sc. from Johns Hopkins. Now with U. S. Public Health Service in Memphis. 1050 Alden Road, Whitehaven, Tenn.

Merrill Lineback
M.D. from Harvard ('39). Now at Mass. Eye & Ear Hospital, Boston, Mass.

Charles Uhl ('39-'41G)
Ph.D. from Cornell. Now teaching Cytology at Cornell U.

Julian T. Darlington ('40-'42G)
Now graduate student at U. of Fla., Gainesville, Fla.

James Barrow ('43)
Ph.D. from Yale U. Now Prof of Biology and head of dept. Huntingdon College, Montgomery, Alabama.

Charles H. Wharton ('48)
Brought back live Tarsius to U. S. after W. W. II. Has made trip to Central and S. America to collect rare animals. Now graduate student at Cornell U.

Branch Howe ('48-'50G)
Now graduate student at U. of Wis., Madison, Wis.

Walter Beck ('48G)
Ph.D. from Rice. Now teaching at U. of Ark., Fayetteville, Ark.

Asa Humphries ('48-'49G)
Graduate student at Princeton U.

Bob Gordon ('49)
Excelled in Herpitology. Now graduate student Tulane U., New Orleans, La.

Mary Elizabeth Walker (Scott)
M.D. from Tulane. Now resident physician at Crawford Long Hospital, Atlanta.

Clara Dunn (Scott)
Graduate student doing research on salamanders at Vanderbilt U., Nashville, Tenn.

B. J. Radford (Scott)
Now in Arizona. Has been helping her husband in atomic research.

Ann Griggs (Scott)
Taking medical technician's course at Emory.

Katharine Loemker (Scott)
Has taken a position at Oak Ridge National Lab.

RHO

—University of Illinois Urbana, Illinois

President—Andrew A. Pandazi, 404 Nat. Hist. Bldg., Univ. of Ill., Urbana, Illinois.

Vice-Pres.—William C. Marquardt, Jr., 345 Nat. Hist. Bldg., Univ. of Ill., Urbana, Illinois.

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Editor—Marcelo H. Bert, 555 Nat. Hist. Bldg., Univ. of Ill., Urbana, Illinois.

Council Rep.—Prof. Norman O. Levine, 219 Veterinary Research Center, Univ. of Ill.

PHI SIGMA BIOLOGICAL SOCIETY
presents
Professor
R. R. KUDO
Protozoologist
Department of Zoology, U. of Ill.
who will speak on
"PIONEERING RESEARCHES ON PROTOZA"

It is often the opinion of students in biological subjects that the most significant research projects of today are of such a nature as to require a great deal of highly technical training and much expensive equipment. That there still exists a great number of opportunities for research of a fundamental or significant nature which may nevertheless be done by means of rather simple methods is the theme which Professor Kudo will develop in the course of this lecture. He will illustrate his thesis with examples of some great biological contributions made in the past with simple procedures.

Professor Kudo received his D.Sc. from the University of Tokyo and held positions as instructor at that university and its Experimental Station until 1916 when he came to this country. Until 1918 he conducted research at the Rockefeller Institute, at which time he was appointed to the staff of the Zoology Department of the University of Illinois. He received his full professorship here in 1944. Dr. Kudo has published numerous papers in the field of Protozoology, much of the work being done under the sponsorship of various laboratories and research foundations. His work has been centered mainly about a very interesting group of Protozoa, the Myxosporidia and Microsporidia. In recent years the cytology of the giant amoeba, Pelomyxa, has received his greatest attention. One of his principal contributions to biology is his textbook, "Protozoology." From his rich store of information Dr. Kudo has provided students with many very valuable suggestions as to ways in which to conduct research. *Although your field is not in that of the Protozoa, it is expected that much can be gained by attendance at this lecture.*

Date: *Wednesday, April 11, 1951*
Time: *7:30 P. M.*
Place: *223 Gregory Hall*

Phi Sigma Society

ELECTION OF OFFICERS WILL FOLLOW DR. KUDO'S LECTURE!

HAVE YOU PAID YOUR DUES? ($1.00 to A. S. C. Ling, 404 Nat. Hist.)

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Gainesville, Florida

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Council Rep.—Dr. W. E. Wilson, Botany Dept., Miami University.

PHI

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Durham, New Hampshire

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Editor—Beatrice Newell—see above.

Council Rep.—Prof. C. F. Jackson, Nesmith Hall, Durham, New Hampshire.

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Treasurer—Robert P. Yost, 811 So. Willson, Bozeman, Montana.

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Council Rep.—John A. Callenbach, 1414 So. Grand, Bozeman, Montana.

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Editor—(to be appointed)
Council Rep.—Dr. M. H. Hatch, Dept. Zoology, Univ. of Washington.

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—University of Oklahoma
Norman, Oklahoma

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ALPHA ALPHA
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Treasurer—Duane McCarty, 2322 Arch, Alliance, Ohio.
Sponsors—Dr. Gail Norris and Prof. O. H. Engle.

Our chapter includes an active membership of 28. We have planned a splendid program for the year with addresses by medical men from the nearby towns and communities. Our first program of the year was held October 11. The speaker was Dr. Gail Norris, associate professor of biology at Mount. Dr. Norris is one of the new faculty members this year and comes to us from Dennison University. He spoke to us on "Problems of the Pre-Med". Another interesting meeting was that of November 8. At this time Dr. Olin Wilson, doctor of internal medicine from Canton, Ohio, spoke about "Advancements in Medicine from 1925". Dr. Wilson made some very interesting notations which led to a rather interesting discussion.

Our meetings are held once a month at the various fraternity houses on campus and usually end with an informal discussion and refreshments. At the last one we held initiation followed by the annual Christmas party. We were also favored with a visit from our former advisor, Dr. A. V. Hunninen, who was in town at the time.

The newly initiated are: John Blackmon, Sidney Bloor, Earl Burky, Robert Chapman, Robert Jones, Robert Kelley, Don Krabil, Mary Ellen Lemmon, Richard Mallory, Ronald Miller, Dr. Gail Norris, and Faye Wyrick.

ALPHA EPSILON
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Pittsburgh, Pennsylvania

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Council Rep.—

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Stillwater, Oklahoma

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Editor—
Council Rep.—Dr. Roy C. Tasker, Bucknell Univ.

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695 Park Ave., New York City

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Editor—
Council Rep.—Dr. Harold H. Clum, Biology Dept., Hunter College.

Alpha Kappa Chapter of Hunter College held its semi-annual initiation in the Picker Room of Roosevelt House on the Sixteenth of December. We were happy to welcome thirteen new members to our Chapter.

We were indeed fortunate in having as our speaker, Dr. Celia Levine of the Biology Department, who spoke on the history of the disease, pernicious anemia. It was a most stimulating and informative speech.

At this time Shelia Wachsler was elected treasurer to replace Hedda Newman, who will graduate. Refreshments were then served and the new members were introduced to the Faculty. It is believed that a good time was had by all.

(Miss) Gertrude Garbers, Sec'ty.

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Council Rep.—Lewis T. Nielsen, Biology Dept., Univ. of Utah, 376 5th Ave., Salt Lake City

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Editor—Jack Wilkes, Botany Department, O.S.C.M., Corvallis, Oregon
Dr. Charles Martin, Entomology Department., O.S.C.M., Corvallis, Ore.

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Univ. of New Mexico, Albuquerque, N. M.

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ALPHA XI
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Kingston, Rhode Island

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Rec. Sec.—Alice-Ann Rose, Biology Dept., Univ. of R. I., Kingston, Rhode Island

Treasurer—Edward S. Goldin, Biology Dept., Univ. of R. I., Kingston, Rhode Island

Editor—Edward S. Goldin

Council Rep.—Prof. R. DeWolfe, Biology Dept.

Twelfth Annual
Biological Conference
OF
Eastern New England
Colleges

APRIL 21, 1951
AT THE

University of Rhode Island

Registration — 9:00-9:50 a.m. — Quinn Hall, Commuter's Room

Demonstrations — 9:00-9:50 a.m.—Ranger Hall, Second Floor and Basement

Student Papers — 10:00-11:40 a.m. — Section A—Ranger 200. Section B—Ranger 103. Section C—Quinn 109. Section D—Ranger 312.

Luncheon—11:45 a.m.-12:30 p.m.—Butterfield Hall

Official Welcome & Announcements—12:30-12:45 p.m.—Butterfield Hall
Wayne Durfee, *Conference Chairman*
Thomas Fanning, *President, Alpha Xi Chapter, Phi Sigma Society, University of Rhode Island*
Harold W. Browning, *Vice President, and Dean of the School of Arts and Sciences, University of Rhode Island*

Demonstrations — 12:45-1:50 p.m.—Ranger Hall, Second Floor and Basement

Student Papers—1:00-2:40 p.m.—Section E—Ranger 200. Section F—Ranger 103. Section G—Quinn 109. Section H—Quinn 103.

Principal Address — 3:00-4:00 p.m. — Quinn Auditorium

Dr. PAUL B. SEARS, Chairman, Conservation Program Yale University, *"Adventures in Conservation"*

Social Hour and Tea—4:00-5:00 p.m.—Eleanor Roosevelt Hall, Lounge

Business Meeting — 4:10-4:30 p.m. — Quinn Auditorium

ALPHA OMICRON
—Marquette University
Milwaukee, Wisconsin

President—James T. Sinski, 1612 E. Webster Pl., Milwaukee 11, Wis.

Vice-Pres.—Joseph Wreschnig, 2804 N. Fratney, Milwaukee 12, Wis.

Corr. Sec.—Dorothy Wood, Marquette University

Rec. Sec.—Kathleen McGowan, 2816 So. Pine Ave., Milwaukee 7, Wis.

Treasurer—Bryan Hoeri, 4000 So. 20 Lane, Milwaukee, Wisconsin

Editor—Arthur Kreitzer, 536 N. 13 St., Milwaukee 3, Wis.

Council Rep.—Dr. E. S. McDonough, Biology Dept., Marquette Univ.

October 16, 1951—Tuesday:
Science Building S-307, 7:45 p.m.
"A Summer of Work and Play at Woods Hole"
Mr. James Sinski, Marquette University, Biol. Dept. Pres. of the Alpha Omicron Chapter

November 20, 1951—Tuesday:
Science Building S-307, 7:45 p.m.
"Nitrogen-Mustard Induced Variability in *Prenochaeta terrestris*"
Dr. E. C. Gasiorkiewicz, Dept. of Plant Pathology. University of Wisconsin, Madison. Former member of this chapter.

ELECTION OF CANDIDATES FOR MEMBERSHIP

December 18, 1951—Tuesday:
Hawthorne Glenn; 7:30 p.m. Subject of a short article in last year's Biologist.
Annual Christmas Party
"Fish are Fun"
Mr. James R. Neidhoefer, Pres. of Neidhoefer & Co., Charter member and 1st President of Alpha Omicron Chapter.

INITIATION OF NEW MEMBERS

January 15, 1952—Tuesday:
Science Building, S-307, 7:45 p.m.
"The Fauna and Flora of the Solomon Islands"
Dr. V. E. Brown, Marquette University, Biol. Dept. Faculty member—war experience in the Solomons.
February 19, 1952—Tuesday:
Science Building, S-307; 7:45 p.m.
"Protozoa as Experimental Animals"
Mr. James Barrett, Marquette University, Biol. Dept. Pres of ΦΣ at U. of Illinois last year.

ELECTION OF NEW CANDIDATES TO MEMBERSHIP

March 16, 1952—Sunday:
Science Building, S-100, 2:00 p.m.
Annual Phi Sigma Lecture
Speaker to be announced later
April 6, 1952—Sunday:
Medford Hotel, 1:00 p.m.
Annual Banquet
Speaker to be announced later

INITIATION OF NEW MEMBERS

April 15, 1952—Tuesday:
Science Building, S-309, 7:30 p.m.
Demonstration of recent research done by members of the society.
Refreshments will be served

ELECTION OF NEW OFFICERS

May 18, 1952—Sunday:
Jackson Park (tentative), 1:00 p.m.
Annual Picnic

ALPHA PI

—University of Colorado
Boulder, Colorado

President—Harold J. Grant, 2507 Grove St. A, Boulder, Colorado
Vice-Pres.—Willard N. Rosine, 2509 Grove St. A, Boulder, Colorado
Treasurer—William Rickard, 835-16 St., Boulder, Colorado
Rec. Sec.—Mary Anne Bingham, 2409 Water St. B, Boulder, Colorado
Corr. Sec.—Albert W. Johnson, 782-19th St., Boulder, Colorado
Council Rep.—Dr. Gordon Alexander, Biology Dept., Univ. of Colorado

Our fall activities began with a business meeting in September when plans were made for the coming year. In October, we heard Dr. C. Harlan Johnson of the Colorado School of Mines at Golden, Colorado, speak on his experiences as a coral reef specialist in the south seas. He worked with the government at Bikini atoll and returned with numerous color photographs of coral reefs and reef animals. His talk was very interesting and was enjoyed by land-locked biologists. The meeting was open to anyone interested in the program, and many students and local townspeople attended.

The same month the chapter held a picnic in the mountains west of Boulder. The flora, fauna and beautiful scenery were viewed briefly, until the rain arrived. Alpha Pi outings for the past two years have been plagued by rain; the usually fine Colorado weather appears to be at odds with us.

In December our fall initiation banquet was held. The following are new members:

Merle E. Brooks
William K. Davis
Lota V. Hatch
Edwin L. Nelson
Herbert F. Schwartz
Mary E. Sharp
Dallas Sutton

Our speaker was Dr. John N. Hough, Professor of Classics, who is deeply interested in bird banding. He is a licensed bander with many years of active work. He told us the history of banding, methods of trapping and banding and demonstrated his technique on two birds captured the day of the meeting. He closed with a discussion of the importance and use of data obtained. It was stimulating to hear from such an active worker, who is occupied professionally in an unrelated field.

Our February meeting will bring Mr. Donald Eff to us. Mr. Eff is also an amateur biologist in Boulder, an actively working Lepidopterist. He possesses a fine collection of North American butterflies and moths, which he has obtained through collection and trading of specimens. We are eagerly awaiting his talk.

Later in the spring we are planning a trip to the Denver Museum of Natural History. A conducted tour of the museum, followed by a behind-the-scenes view of museum techniques in the preparation of displays, is expected. Our spring initiation banquet will be another major project for the coming semester.

ALPHA RHO
—University of Arkansas
Fayetteville, Arkansas

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Vice-Pres.—James R. Rasch, 523 Leverett St., Fayetteville, Arkansas
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Treasurer—Wayne Myers, 753 W. Dickson, Fayetteville, Arkansas
Editor—Joseph F. Maries, 25 S. Duncan, Fayetteville, Arkansas
Council Rep.—Dr. Delbert Swartz, 607 No. Razorback Road, Fayetteville, Arkansas

ALPHA SIGMA
—University of Texas
Austin, Texas

ALPHA TAU
—Mexico

ALPHA UPSILON
—University of California at Los Angeles, Los Angeles, California

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Vice-Pres.—Dexter Howard, c/o Bact. Dept., UCLA, Los Angeles 24, Calif.
Corr. Sec—Howard Hoffman, c/o Vivarium, UCLA, Los Angeles 24, Calif.
Rec. Sec.—Edwin Weiler, c/o Vivarium, UCLA, Los Angeles, 24, Calif.
Treasurer—Alice Rudolph, c/o Zoology Dept., UCLA, Los Angeles 24, Calif.
Editor—Allan Schneiderman, c/o Bact. Dept., UCLA, Los Angeles 24, Calif.
Council Rep.—Dr. Phinney, Botany Dept., UCLA, Los Angeles 24, Calif.

ALPHA PHI
—College of Puget Sound, Tacoma, Washington

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Treasurer—Larry Hoover, 3314 No. 31st St., Tacoma, Washington
Editor—Corrine Engle, 360 Lake Louise Dr., Tacoma, Washington
Council Rep.—Dr. Gordon A. Allorn, 3806 No. 24th St., Tacoma, Wash.

ALPHA CHI
—University of the Philippines
Quezon City, P. I.

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Vice-Pres.—Miss Alicia V. Maravillas, Dept. of Botany, Univ. of Phil.
Corr. Sec.—Miss Lilia Canero, Dept. of Zool., Univ. of Phil.
Rec. Sec.—Miss Filomena Fortich, Dept. of Botany, Univ. of Phil.
Treasurer—Miss Leticia Dizon, Dept. of Botany, Univ. of Phil.
Editor—Justo de la Paz, Dept. of Zool., Univ. of Phil.
Council Rep.—Dr. Gregorio T. Velasquez

ALPHA PSI
—Virginia Polytechnic Institute
Blacksburg, Virginia

President—Willie R. Stafford, 206 Otey Street, Blacksburg, Va.
Vice-Pres.—Louis J. Lancaster, Box 4026, V.P.I., Blacksburg, Va.
Corr. Sec.—William S. Davis, Box 3024, V.P.I., Blacksburg, Va.
Rec. Sec.—Jacqueline J. Kelley, Box 3598, V.P.I., Blacksburg, Va.
Treasurer—Mitchell A. Byrd, 307 Clay Street, Blacksburg, Va.
Editor—James T. Buck, Box 2807, V.P.I., Blacksburg, Va.

December 11, 1951, was the day of the initiation of new members for the fall quarter. The formal initiation was held in the Monogram Club room of the War Memorial Hall at six o'clock. At this time the following members were taken into the society: Charles W. Holdaway, Robert H. Brame III, Richard G. Crosby, Francis G. Davis, Harriet H. Farrier, Alvin D. Gammon, Junior B. Hilman, Frank H. Hulcher, Louis R. Hundley, William C. Kellner, Lauren O. Lyons, Charles J. Mayhew, John H. McLaughlin, Warren G. Mitchell, Edward B. Phipps, Warren H. Taylor.

The certificates and keys were awarded by Professor A. B. Massey, our Council Representative. Professor C. W. Holdaway, head of Dairy Husbandry was initiated as an honorary member to our chapter. After the initiation all old and new members adjourned to the faculty dining hall for the banquet. Our guest speaker was Professor Holdaway. His topic was "Honor Societies—What They Mean and What They Should Mean to Us." The banquet was adjourned by the president with a reminder that our next regular meeting would be on January 3, 1952, at 7:30 P.M.

ALPHA OMEGA
—University of Georgia
Athens, Georgia

President—J. C. Major, Dept. Biology, Univ. of Georgia, Athens, Ga.
Vice-Pres.—J. B. Harris, Dept. Botany, Univ. of Georgia, Athens, Ga.
Corr. Sec.—R. E. Bradley, Dept. Biology, Univ. of Georgia, Athens, Ga.
Rec. Sec.—Henry Robert, Dept. Biology, Univ. of Georgia, Athens, Ga.
Treasurer—Lois Drawdy, Dept. Biology, Univ. of Georgia, Athens, Ga.
Editor—Elizabeth Bennett, Dept. Biology, Univ. of Georgia, Athens, Ga.
Council Rep.—Dr. Elon E. Byrd, Dept. of Biology

College Projects Are of Aid to Air Force

The Air Force has established a widescale program to bring the talents of academic scientists and engineers to bear on major Air Force problems. It has evolved a system of university-operated projects or laboratories to augment its long-range research and development activities. Under this system, an Air Force problem is assigned to a college or university for study—under contract—by a highly qualified team of its staff members.

This program was first initiated some years ago with a Bomb Damage study at Lehigh, and a study at the University of Chicago to determine Optimum Weapons for Aerial Combat. Early last year, the scope of the program was expanded to a system basis with the establishment, at the Massachusetts Institute of Technology, of a broad study of continental air defense. The project which was sponsored by all three services was based on the premise that, against modern explosives and modern aircraft, adequate protection of our homeland by conventional methods had become virtually impossible. Participation included faculty members from Cornell, University of Illinois, Harvard, University of Wisconsin, University of Rochester, and many eminent scientists from industry.

The natural barriers to airpower development are being attacked on a variety of fronts at a number of institutions. Weather forecasting studies are being conducted at the Universities of Cincinnati, California, New Mexico, Alaska, and at Duke, Temple, Columbia and New York University. At Carnegie the faculty scientists are engaged in research for the Air Force in the field of radiation and atmospheric energy, as are other scientists at Cornell, Rhode Island State, Pennsylvania State, Oregon, Iowa State and the University of Utah. At Tufts College and Colorado University the study subject is cloud physics. At Syracuse and Ohio State it is infra-red sources and infra-red filters. At Chicago and Florida it is transmission research. Boston University investigates atmospheric probing with missiles. Johns Hopkins, Rensselaer Polytechnic Institute and New Mexico A. and M. deal with climatizing . . . Purdue with micro-wave noise sources. — Major General Donald L. Putt, at Carnegie Institute of Technology.

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The Tasks Ahead

Two tasks confront higher education in this momentous moment. Both involve serious, practical concern for the road ahead. If there has been an ivory tower educational institution still enjoying its intellectual privileges without this concern, that school is trading on its heritage without accepting its responsibility.

Higher education's first task in this crisis is to continue true research and genuine intellectual inquiry, in the quest for validation of the old as well as discovery and application of the new fact. This approach must continue without fear and without favor; in the attempt, as Goethe put it, "To keep pressing our outposts into the darkness and to establish no post that is not perfectly in the light and firm."

The opportunity to continue this unbiased search is dependent on the continuation of vital democracy. Experience has proved conclusively that no true liberal education can exist in a police state. For there science is slanted wholly to the interests of national defense; discussion is reduced to partisanship; music is metered to parades; religion is laid out in museums; and criticism of government invites imprisonment. There education is a pawn and the educator a slave of the state. Higher education must be devoted to learning, within the framework of freedom.

In the second phase, higher education will develop a well lighted path into the abiding realities learned in the past, in philosophy, in history, in sociology, in economics, and in religion.

Beyond all other powers of revival for flagging human spirits is the intellectual, emotional and spiritual power of an idea. It is found in the new support of the humanities by industry, the growing awareness that leaders must be trained with more than technical skills. It is seen in the projecting of foundation funds into community living and adult education. It is known in the returning analysis of democracy as a conviction about man, that he is a creature of infinite worth, has rights and responsibilities and meaning, as a Person.

Actually, democracy is a homely, personal thing. It is the sum of what men think of themselves, of their opportunities and their responsibilities. We will do well to emphasize responsibilities, the discipline of hard work, the dignity of struggle, the self-giving of social concern and service, the strength of religious conviction and commitment. — President H. C. Case, Boston University.

▽

Education for Democracy

American Studies 21-22 was instituted four years ago under the New Curriculum at Amherst College. Subdivided into twelve parts, the American Studies course is concerned with twelve different problems which are of importance in American history or are now facing the United States as live and burning issues.

Professor George R. Taylor, one of the founding fathers of the course, has written: "It is designed first to lead the student to become interested in and to think about the problems of modern society, and second, to encourage him to form relevant judgments as to issues and policies."

The real significance of the course lies not in problems One through Twelve. What happens when the student faces Problem 13? If he can apply what he has learned in the course to any problem which faces him as a junior, senior, or after he leaves Amherst College, then he has learned the real point of Problems in American Civilization.

If American Studies 21-22 is successful, and we believe that it is, it is successful because it has instilled in the minds of those who have taken the course a few ideas on how to think. Not what to think; *how* to think. That's education for democracy.—*Amherst Alumni News.*

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(A member may receive both publications at a special combination rate by adding $3.50 to the annual dues of $6.50.) About one quarter of the membership have become fellows through their scientific contributions and attainments.

The AAAS seeks not only to further cooperation among scientists in all the diverse fields but also it is increasingly concerned with the improvement of human welfare and in a better public understanding of the interrelations of science and human progress. The sections are broad enough to include not only all professionally trained scientists who appreciate the place of science in our contemporary civilization but any person interested in science who wishes to keep informed, and who is concerned with the proper integration of science and human society. With great governmental research agencies on the increase and impending social legislation with scientific aspects, more than ever a strong, unified scientific association, representative of the clearest thinking in science is needed.

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OBJECTIVE: THE BIOLOGIST desires to publish comparatively short contributions to the progress of the biological sciences, either as beginning research, progress reports or side line discoveries arising out of, or tangential to, completed or nearly completed research problems.

CONTRIBUTIONS: Articles submitted must represent some definite if only minor contribution to the biological field. Purely historical, biographical or historical articles by students will not be considered.

ADVISORY: The opinions of research specialists may be sought by the Editor as to the advisability of publishing any article submitted.

LENGTH: Articles must be as short as consistent with adequate treatment of the research reported. Extensive recapitulation of previous work on the problem should be eliminated.

ABSTRACTS: A brief summary of not more than fifty words must be separately presented with original copy for forwarding to *Biological Abstracts* as soon as the date of publication is determined. Summaries should follow the format used in *Biological Abstracts.*

ILLUSTRATIONS: Sharp photographs or clear line drawings *in ink,* NOT PENCIL, may be submitted. Lengths of articles should be curtailed in proportion to the extent of illustrations used. Cuts used will be paid for by the contributor at standard engraver's rates and become *his* property immediately after publication.

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Address all communications to:
ANSELM M. KEEFE, Ph.D., *Editor "The Biologist"*
West Depere, Wis.

PHI SIGMA
BIOLOGICAL HONOR SOCIETY

"The object of Phi Sigma is to promote interest in biological research. Although always designated as an honorary biological research society, it should be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

Mile Posts

1915 March 17, Alpha Chapter organized, Ohio State University, Columbus.

1916 May, Central Governing Body organized, BIOLOGIST first issued.

1917 June, last War-time BIOLOGIST issued.

1921 February, BIOLOGIST revived.

1924 December, First National Meeting, Constitution revised, Washington, D. C.

1925 December, Second National Meeting, First Science Program, Kansas City.

1926 December, Third National Meeting, Second Science Program, Philadelphia.

1927 December, Third Science Program, Nashville.

1928 December, Fourth National Meeting, Coat-of-Arms adopted, Fourth Science Program, New York.

1930 January, Council Meeting, Ritual Revised, Norman, Okla.
December, Fifth National Meeting, Fifth Science Program, Cleveland.

1931 Phi Sigma Letters Registered, U. S. Patent Office.

1932 December, Sixth Science Program, Atlantic City.

1933 June, Sixth National Meeting, Seventh Science Program, Chicago.

1935 December, Seventh National Meeting, Eighth Science Program, St. Louis.

1937 December, Eighth National Meeting, Ninth Science Program, Indianapolis.

1939 December, Ninth National Meeting, Tenth Science Program, Silver Anniversary, Ohio State University, Columbus.

1941 December, Tenth National Meeting, Dallas, Texas.

1946 December, Eleventh National Meeting, Boston, Mass.

1948 December, Twelfth Meeting, Eleventh Science Program, Albuquerque, N. Mex.

1949 February, Joins the Association of College Honor Societies.

1950 December, Thirteenth Meeting, Denver and Boulder, Colorado.